Pharmacology International

No. 88 June 2017 The semi-annual newsletter from the International Union of Basic and Clinical Pharmacology

In This Issue

IUPHAR International Union of Basic and Clinical Pharmacology

WCP2018 KYOTO

18th WORLD CONGRESS OF BASIC AND CLINICAL PHARMACOLOGY

July 1 (Sun) - 6 (Fri), 2018

Kyoto International Conference Center, Kyoto, Japan

Pharmacology for the Future

Science, Drug Development and Therapeutics

Call for Abstracts

IMPORTANT DATES

Abstract Submission Opens	**August 1, 2017**
Abstract Submission Deadline	**December 14, 2017**

The Scientific Program Committee for the 18th World Congress of Basic and Clinical Pharmacology are inviting the submission of scientific abstracts for poster presentations. Authors are asked to submit abstracts under the following categories:

1. Neuroscience
2. Pain
3. Cardiovascular System
4. Nephrology and Urology
5. Immunology, Inflammation and Bone Metabolism
6. Gastrointestinal System
7. Stem Cell Medicine
8. Metabolism and Diabetes
9. Respiratory System
10. Systems Biology
11. Education and Training
12. Sensory System
13. Cancer
14. Rare Diseases
15. Molecular Bioimaging
16. Infection/Global Infectious Diseases
17. Natural Medicine and Traditional East Asian Medicines
18. Regulatory Science
19. Pharmacovigilance
20. Health Economics
21. Toxicology
22. Genomics/Pharmacogenomics/Personalized Medicine
23. Pharmacometrics
24. Pharmacokinetics
25. Pediatric Clinical Pharmacology
26. Industry-Academia Collaboration
27. Miscellaneous

Submission guidelines are now available on the WCP2018 website.

Registration Information

	Early Registration	Regular Registration	On-site Registration
Regular	JPY 40,000	JPY 45,000	JPY 50,000
Student	JPY 10,000	JPY 10,000	JPY 10,000
Accompanying Person	JPY 15,000	JPY 15,000	JPY 15,000

Further details on registration will be available on the WCP2018 website.

Congress Bursaries

Congress bursaries will be available for young investigators. This bursary will consist of registration fee reimbursement and partial travel support. Details will be announced after August 2017 on the WCP2018 website.

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Scientific Program

THEME

Pharmacology for the Future
~Science , Drug Development and Therapeutics~

40 Lectures

- **Opening Lecture**
  Cancer Immunotherapy
  Tasuku Honjo, M.D., Ph.D. Kyoto University, Japan
- **Plenary Lecture**
  Recent Progress in iPS Cell Research and Application
  Shinya Yamanaka, M.D., Ph.D. Kyoto University, Japan

  Optogenetics
  Karl Deisseroth, M.D., Ph.D. Stanford University, USA

  The Cardiovascular Effects of Peptidase Inhibition
  Nancy J. Brown, M.D. Vanderbilt University Medical Center, USA

  Drug Development as an Outcome of Integration of Basic and Clinical Pharmacology
  Adam Cohen, M.D., Ph.D. Center for Human Drug Research, The Netherlands
- **Tang Prize Lecture**
  Genome Engineering: Technologies and Applications
  Feng Zhang, Ph.D. McGovern Institute for Brain Research, USA
- **Analytical Pharmacology Lecture**
  Towards a Molecular Understanding of Drug Action at GPCRs
  Bryan L. Roth M.D., Ph.D. University of North Carolina at Chapel Hill, USA

and 33 Cutting Edge Lectures

85 Symposia

\+ Oral Sessions
Poster Sessions
Luncheon Seminars

326 speakers from 38 countries and regions
(Lectures, Cutting Edge Lectures and Symposia)

(As of April 2017)

Continued on page 3...

Approved Satellite Symposium

(Symposium themes are tentative)

- Receptor Structure Changes the Pharmacology Paradigm (Incorporating the 10th Adrenoceptor Symposium)
- In Vivo Neuropharmacolgy
- Systems Pharmacology and Artificial Intelligence Based on Real World 'Big' Data
- Brain Mapping and Therapeutics
- G Protein-Coupled Receptor Satellite Symposium
- Pediatric Pharmacology
- Educating Scientists and Healthcare Professionals for 21st Century Pharmacology

For more information, please visit the WCP2018 website.

Accommodation Information

With a long history as the leading tourist city in Japan, Kyoto offers over 20,000 rooms in the central area, with everything from economic youth hostels and budget hotels to first class city hotels and traditional Japanese style inns “Ryokan.” Many hotels are located along the subway lines within 10-20 minutes from the congress venue.

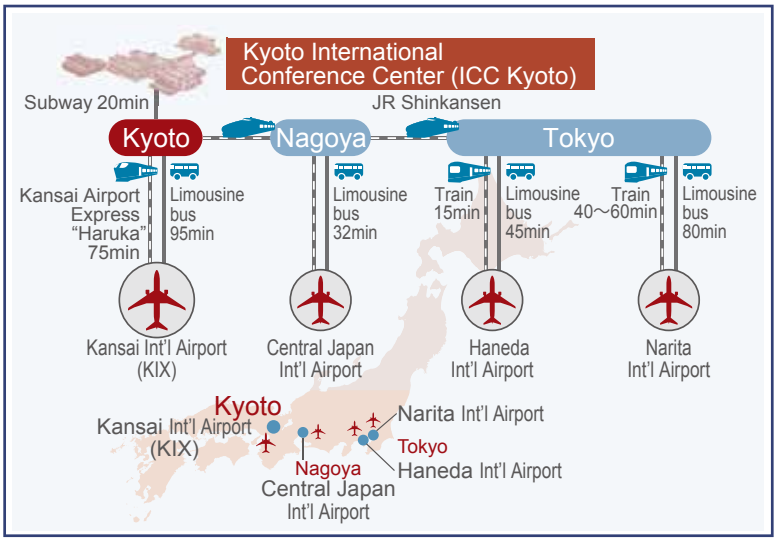
WCP2018 will offer preferential rates to the delegates for the duration of the Congress. More information will be available on the WCP2018 website.

About Kyoto

Access

Getting to Kyoto

The Kansai International Airport (KIX), located slightly over an hour away from Kyoto, is the second major international airport in Japan after Narita (Tokyo). 76 airlines from over 80 different cities throughout the world serve KIX with over 1,200 flights per week. KIX is approximately eleven hours from points within Europe - almost the same amount of time it would take to reach the West Coast of the USA. Kyoto can also be reached in 2.5 hours from Tokyo by the super express Shinkansen (bullet) train.



Getting around Kyoto

The compact modern city of Kyoto is a delight to stroll because it adheres to the ancient grid pattern street layout. In addition, the excellent subway, rail and bus services make Kyoto the “30-minute city”. You can generally arrive at your next destination within half an hour.

Visas

Japan operates a visa-waiver program for 67 countries and regions (information from Japan’s Ministry of Foreign Affairs, last revised December 2014). Travelers on short-term stays for the purpose of attending a conference, tourism, etc. from these countries do not require a visa to enter Japan. For those who require a visa to enter Japan, the congress secretariat will prepare the necessary documents for the participants’ visa applications.

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What to Do in Kyoto

UNESCO World Heritage Sites

With its long history and traditional culture, Kyoto has many locations registered as UNESCO World Heritage Sites. No trip to Kyoto would be complete without visiting some of them. This high concentration of world cultural heritage sites is one of Kyoto's unique attractions.

Gardens

Kyoto is a garden lover's paradise. It has been the political, religious and cultural capital of Japan for several centuries, and this environment has fueled the development of all major Japanese traditions. Emperors, aristocrats, samurai - they all included wonderful gardens in their residences, some of which can still be explored today.

Gion

Gion is one of the main districts of Kyoto. The area developed as a town around the Yasaka-jinja Shrine, and is now famous for its traditional architecture and the elegant 'maiko' (apprentice geisha) dancers, who can often be seen taking a stroll through the area. The houses here continue to retain their latticework with a refined appearance, and the district is designated as a protected area to preserve its historical value.

Cuisine

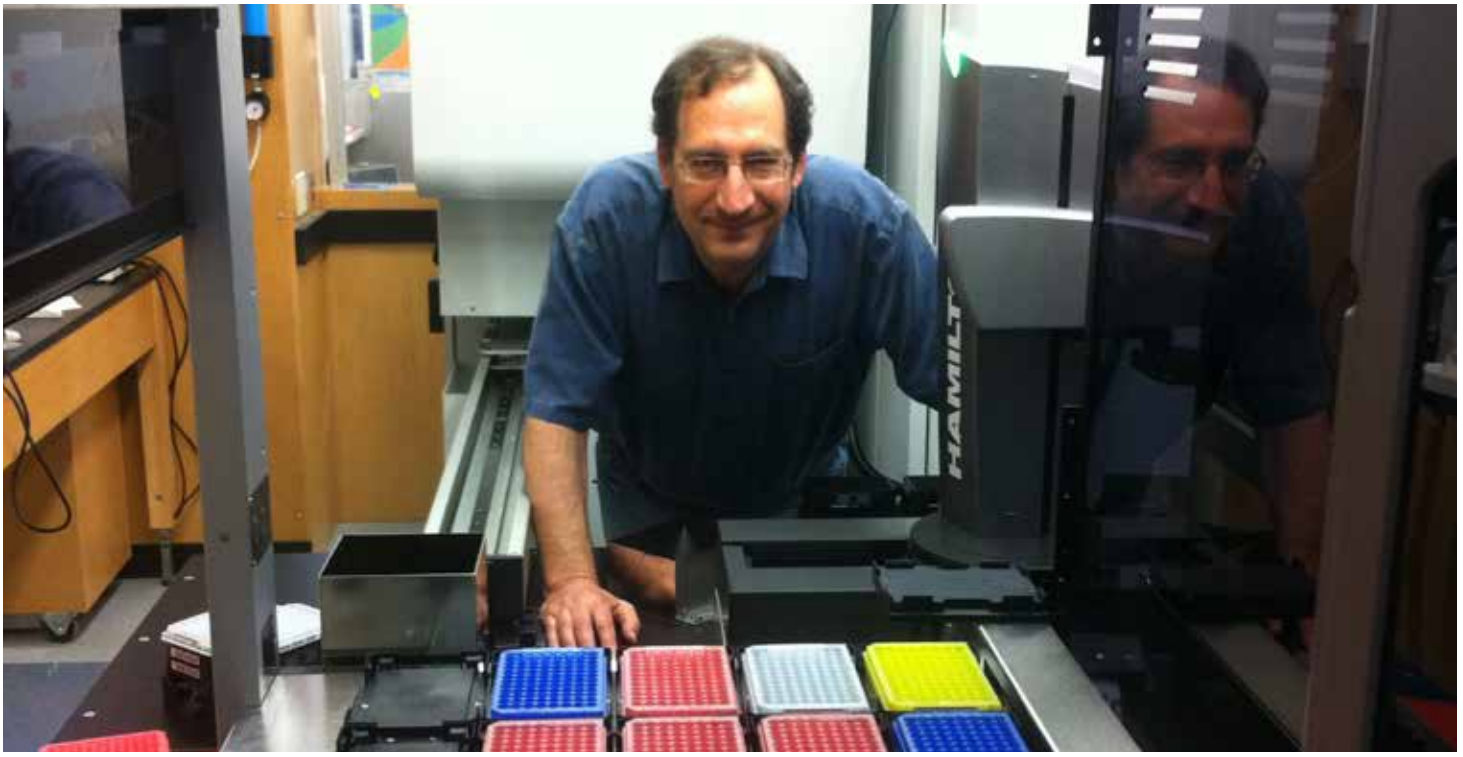
There is a wide variety of cuisine available in Kyoto. Besides Washoku, or Japanese food, which was designated an intangible culture heritage by UNESCO in 2013, there are also restaurants where one can enjoy other cuisines such as Italian or French, and many reasonably priced eateries as well. Halal and vegetarian-friendly restaurants are also available.

Tea ceremony

Kyoto offers the unique opportunity to learn about Japanese culture in the birthplace of many Japanese traditions. Though tea ceremony is practiced throughout Japan, the major schools were developed and still flourish in Kyoto. Hands-on traditional culture experiences will give participants and accompanying persons a taste of the unique appeal of Japan.

Cycling

Kyoto is regularly voted one of the best bicycle cities in Asia, and for good reason: the city is largely flat, roads are well maintained, drivers are sane and there are plenty of places to rent a bicycle. Feel the wind and explore Kyoto by bicycle!



Bryan L. Roth

We are delighted to announce that the 2018 IUPHAR Analytical Pharmacology Lecture will be delivered at the 18th World Congress of Basic and Clinical Pharmacology in Kyoto, Japan, by Dr. Bryan L. Roth (MD, PhD), who is the Michael Hooker Distinguished Professor of Pharmacology at the University of North Carolina Chapel Hill School of Medicine, USA. Dr. Roth received his MD and PhD (Biochemistry) from St. Louis University in 1983 and subsequently trained in pharmacology at the National Institutes of Health, and molecular biology and psychiatry at Stanford University. Dr. Roth has published more than 400 papers in the general area of the molecular pharmacology of drug actions, including a large number of papers published in Science, Nature and Cell over the past decade. Amongst his seminal contributions to the field include the elucidation of mechanisms underlying the structural basis of drug action at central G protein-coupled receptors (GPCRs), particularly serotonin and opioid receptors; as well as more recently providing atomistic level details on the structural basis of biased agonism; the development of novel cell-based screening platforms to discover chemical probes and tools for all classes of GPCRs; the pioneering of large-scale chemical genetic approaches to discover, characterize and validate novel molecular targets for therapeutic drug discovery, and the invention of a revolutionary chemogenetic platform called "DREADD" (Designer Receptors Exclusively Activated by Designer Drugs), which has become a widespread tool worldwide for the interrogation of neuronal circuits responsible for simple and complex behaviors. Throughout all his contributions, Dr. Roth's work has been underpinned by a deep appreciation of the vital role that analytical and molecular pharmacology play in the ultimate discovery, understanding and therapeutic utility of medicinal agents acting at GPCRs.

Dr. Roth has more than 40 patents and has founded 2 companies. He has been elected to the National Academy of Medicine of the National Academy of Sciences and has received many honors including the Goodman and Gilman Award for Receptor Pharmacology (ASPET; 2016), the PhRMA Foundation Excellence in Pharmacology Award, and a NARSAD Distinguished Investigator Award. Dr. Roth has also given many endowed lectures including the Goodman, Koppyani, Strongwater, Niznik, Swammerdam, Lowenthal, S.G. Fergusson, Chauncy Leake and Philip S. Portoghese Lectures. Dr. Roth has also been named the 2017 Martin S. Rodbell Lecturer and the inaugural 2017 Elliot Saul Vessell Visiting Professor. Finally, Dr. Roth has also been named a Thomson Reuters/ Clarivate Analytics 'Highly Cited Scientist' in Pharmacology and in Biology and Biochemistry. Previous recipients of the Analytical Pharmacology Lecturer award, which was instituted by Sir James Black in 1994, are Dr. Alberto Kaumann (1998), Dr. David Colquhoun (2002), Dr. Terry Kenakin (2006), Dr. Paul Vanhoutte (2010) and Dr. Arthur Christopoulos (2014). We congratulate Dr. Bryan Roth for his ongoing and impactful contributions to the field and for helping to maintain the spirit embodied by the award of IUPHAR Analytical Pharmacology Lecture in an ever-changing pharmacological landscape. •

Arthur Christopoulos and Stephen Alexander

Development of an International Geriatric Clinical Pharmacology Curriculum for Medical Students

The Geriatric Pharmacology Subcommittee of the Clinical Division of the International Union of Basic and Clinical Pharmacology (IUPHAR) has been developing an international curriculum in geriatric clinical pharmacology for medical graduates. Dr. Mandavi Kashyap spent three months with Prof. Sarah Hilmer working on this project late in 2016, supported by an Australian Government Endeavour Fellowship.

Doctors need core knowledge, skills and attitudes to be able to prescribe safely and effectively for the ageing population in developed and developing countries. We produced a comprehensive curriculum in geriatric clinical pharmacology that could be applied in medical schools internationally. We developed a draft curriculum from our review of the published and grey literature. This draft curriculum was distributed to international experts in geriatric clinical pharmacology, clinical pharmacology, geriatric medicine and geriatric pharmacy. We thank Lynn LeCount for distributing the draft curriculum to IUPHAR member organisations, and thank those who responded to our questionnaire and informed this project.

Respondents represented most regions of the developed and developing world. Almost all respondents reported that it is important to include a comprehensive geriatric clinical pharmacology curriculum in medical programs, and that the learning outcomes in the draft curriculum were appropriate. Issues to inform implementation were identified.

We plan to disseminate the curriculum through publication of an academic paper describing its development, and through review and possible endorsement by relevant professional organisations with an interest in education on quality use of medicines for older adults. •

Sarah Hilmer
Chair, IUPHAR Geriatric Clinical Pharmacology Subcommittee
www.Geriatrics.IUPHAR.org

Guiding Pharmacology for 30 Years
The Past, Present and Future of NC-IUPHAR

How can pharmacology integrate the tsunami of new data, which can revolutionise our concepts? This is not a new problem. In the 1970s and 1980s, receptors were almost metaphysical entities with multiple arguments about their definition, based mainly on comparative pharmacology rather than structure. Despite this, pharmacologists such as Roy Brittain, leading the 40-strong pharmacology group at GlaxoSmithKline, invented drugs with a cumulative sales value of >£350 billion, all acting on G-protein-coupled receptors (GPCRs) or nuclear receptors. Beginning in 1983, a working group lead by Paul Vanhoutte, with Theo Godfraind and Michael Spedding, had classified calcium channels and the drugs modulating them, then termed 'calcium-antagonists'. The President of IUPHAR at that time, Sir Colin Dollery, persuaded Paul Vanhoutte to chair a nomenclature committee to resolve the controversies in receptor classification. The IUPHAR Committee for Receptor Nomenclature and Drug Classification (NC-IUPHAR) was officially launched in 1987 during the Xth International Congress of Pharmacology in Sydney, Australia.

The leadership

The standards Paul initiated for the committee have proven effective for over thirty years. The well documented biannual meetings of the core committee offered an economy flight to Paris plus a nice dinner as the reward to the participants for an intensive weekend followed by hard work. The core committee (Table 1) animated expert subcommittees on the nomenclature and ligands on key receptor systems. The results were captured in the highly cited articles published in *Pharmacological Reviews*, which first appeared in 1992.

Table 1

1994 Membership of the IUPHAR Committee for Receptor Nomenclature and Drug Classification*

Alison Abbott	München, Germany
Eric A. Barard	London, United Kingdom
Tom I. bonner	Bethesda, Marylandy, USA
Phillip B. Bradley	Birmingham, United Kingdom
George J. Cosmides	Bethesda, Marylandy, USA
B.N. Dhawan	Lucknow, India
C.T. Dollery	London, United Kingdom
C.R. Ganellin	London, United Kingdom
T. Godfraind	Bruxelles, Belgium
J.P. Green	New York, USA
M. Hamon	Paris, France
P.P.A. Humprhey	Cambridge, United Kingdom
D.H. Jenkinson	London, United Kingdom
T. Kenakin	North Carolina, USA
S.Z. Langer	Paris, France
T. Masaki	Kyoto, Japan
R. Paoletti	Milano, Italy
M. Spedding (Secretary)	Suresnes, France
U.G. Trendelenburg	Tübingen, Germany
P.M. Vanhoutte (Chairman)	Courbevoie, France

Modified with permission from PM Vanhoutte, EA Barnard, GJ Cosmides, PP Humphrey, M Spedding, and T Godfraind (1994), International Union of Pharmacology Committee on Receptor Nomenclature and Drug Classification, Pharmacol Rev, 46(2):111-116

* For the Current NC-IUPHAR Membership, visit www.guidetopharmacology.org/nciuphar.jsp#membership

Richard Bond served as the NC-IUPHAR secretary for the first two years then was succeeded by Michael Spedding. The meetings were and continue to be very lively, usually good-humoured and rarely vituperative, covering most aspects of pharmacology, yet are efficiently chaired so that over the thirty years they have almost all ended right on time, despite packed agendas. A key rule is what is said within the committee stays within it, until published. This allows remarkable forward-thinking conversations. Paul resigned in 1996 to become the IUPHAR secretary general, at which time Robert (Bob) Ruffolo took the helm as chair. At Bob's retirement in 2000, Michael Spedding stepped up from secretary to chair NC-IUPHAR. Anthony (Tony) Harmar managed the database from 2000 until 2014, extending it from the narrowly focused IUPHAR Receptor Database to the broadly representative IUPHAR/BPS Guide to Pharmacology. When Michael resigned to become the IUPHAR secretary general in 2014, Steve Alexander became the next chair and an executive committee was established to help manage the many activities.

In the beginning

The early days were spent establishing guidelines for receptor nomenclature, and sorting out the most crucial problems of the pharmacology at the time. Such efforts led to some ground-breaking classifications and highly cited papers. The committee had influential molecular biologists, such as Tom Bonner and Eric Barnard, coupled to experienced pharmacologists and worldwide representation (Table 1). Alison Abbott was the editor of *Trends in Pharmacology* and offered valuable support. Debbie Girdlestone succeeded her and edited the first two in a series of influential IUPHAR compendia on receptor characterization and classification. Clarifying the

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30 YEARS OF NC-IUPHAR (CONTINUED)

5-HT receptor nomenclature was urgent as the multiple receptors had resulted in naming convention chaos. The NC-IUPHAR subcommittee worked diligently with the Serotonin Club (now called the International Society for Serotonin Research) in developing provisional receptor nomenclature symbols, compared with accepted nomenclature, and guidelines for such a fluctuating situation. The output of those efforts is the International Union of Pharmacology classification of receptors for 5-hydroxytryptamine (Serotonin) [Pharmacol Rev. 46: 157-203. PMID:7938164], which has been cited >3,000 times. The nomenclature papers for prostanoid receptors (chaired by Robert Coleman), adenosine receptors (chaired by Bertil Fredholm), angiotensin receptors (chaired by Marc de Gasparo and Kevin Catt), and chemokine receptors (chaired by Phil Murphy) have each been cited >2,000 times. The nomenclature publications on cannabinoid receptors (chaired by Roger Pertwee and Allyn Howlett), muscarinic receptors (chaired by Nigel Birdsall), calcium channels and their modulators (chaired by Michael Spedding and Rodolfo Paoletti) were also very influential.

In order to gain momentum outside the field of GPCRs, the committee changed strategy in order to attract highly respected and dynamic scientists who could resolve an entire field by recruiting major scientists to, in their turn, lead and recruit subcommittees and thereby resolve controversies on a bigger scale. Obtaining substantial effort from busy academic scientists is difficult without some reward. However, leading IUPHAR subcommittees was prestigious and being on the subcommittees allowed the publication of highly cited reviews, which also rewarded key postdoctoral scientists who contributed to the reviews and database templates.

William (Bill) Catterall organised subcommittees for all the voltage-gated ion channels and within a year produced the compendium of voltage-gated ion channels (Catterall et al, 2003), with a rationale nomenclature that clarified the entire field. Other insightful reorganisations included the contentious area of $GABA_A$ receptor nomenclature (Bowery et al, 2002), the classification of nuclear receptors (Germain et al, 2006), and ligand-gated ion channel receptor nomenclature (Collingridge et al., 2009). Doriano Fabbro produced the kinase database with relevant pharmacology in the website within a year. Thus, all known kinases are covered, including the screening data from DiscoveRx and Millipore, together with data on all drugs interacting with kinases and featuring tree-spot plots to show the relative selectivity of drugs at the various kinases. The recent classification of transporters was also achieved in about a year under the guidance of Steve Alexander. These efforts involved multiple subcommittees set up and managed by the NC-IUPHAR liaison experts with direct support from the NC-IUPHAR chair.

The meetings that hatch these reviews (see the above photograph of the April, 2013 participants in Edinburgh) are also great fun scientifically, which ensures participation. The IUPHAR/BPS guidetopharmacology.org is backed by 90 expert subcommittees of about 700 scientists, which are coordinated by five curators**.** This is a process that works. The complexities of drug-receptor interactions are such that small meetings of experts around key questions can be more productive than massive computer-driven data trawling. Select meetings of experts can clearly and rapidly define what we do and don't know quickly. The resulting recommendations (www.guidetopharmacology.org/nciupharpublications.jsp) have a Hirsh index of >76 (https://scholar.google.fr/scholar?q=international+union+pharmacology&btnG=&hl=fr&as_sdt=0%2C5). The recent articles also include *what we don't know* (www.ncbi.nlm.nih.gov/pubmed/?term=IUPHAR[Title]%20AND%20Review[Title]&cmd=DetailsSearch). For general pharmacology, a technical committee defines terms and symbols whereas the potential tsunami of spurious GPCR heterodimers, caused by

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Figure 1: Number of publications (Frequency) per year from NC-IUPHAR in Pharmacological Reviews

Figure 2: Citations for publications, identified for the year of publication, from NC-IUPHAR in Pharmacological Reviews

Figure 3: Number of publications (Frequency) per year from NC-IUPHAR in the British Journal of Pharmacology

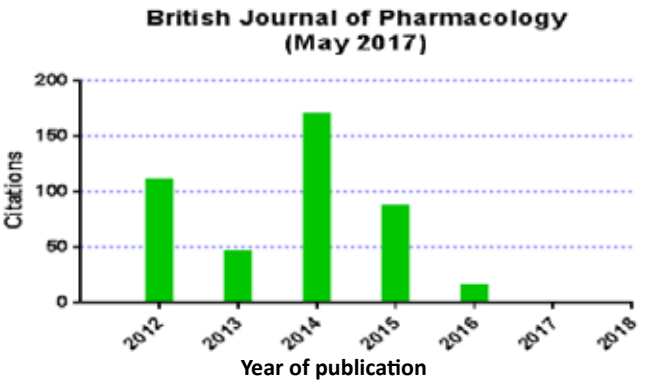

Figure 4: Citations for publications, identified for the year of publication, from NC-IUPHAR in the British Journal of Pharmacology

Observations by the NC-IUPHAR Chair on Its Publications

This year we published the 100th and 101st in the list of NC-IUPHAR-commissioned reviews in *Pharmacological Reviews*. Since 1992, there have been typically two publications a year (Figure 1). The peak of publications was in 2005/2006, when 22 reviews were published over the two years. This was in significant part due to publication in 2005 of the IUPHAR Compendium of Voltage-Gated Ion Channels, compiled by Bill Catterall and a host of colleagues. The following year, the IUPHAR Compendium of the Pharmacology and Classification of the Nuclear Receptor Superfamily was published by Vincent Laudet and multiple co-authors.

If we track those publications in more detail, we can identify that there is a phenomenal accumulation of citations. According to Thompson ISI Web of Science, this aggregates over 33000 citations in May 2017. This provides a mean number of citations for *Pharmacological Reviews* NC-IUPHAR output as close to 340 citations per review. As you might imagine, however, this is not an even distribution (Figure 2) – nobody seriously expects citations to exhibit a Gaussian distribution(!). In fact, the six reviews from 1994 have accumulated nearly 7000 citations, with the 5-HT receptor review from Danny Hoyer and colleagues having over 2500 citations alone.

Based on this skewed distribution of citations, it is possible for two influences on the citation frequency to be identified. First, the older reviews have more time to accumulate those extra citations. Second, the topics chosen earlier in the sequence would have been 'mainstream' targets – aside from 5-HT receptors, 1994 had reviews on adrenoceptors, purinoceptors (adenosine, P2X and P2Y receptors), prostanoid and endothelin receptors. In the last decade, however, the focus has more commonly been on G protein-coupled receptors where the endogenous ligand/s have been identified after the receptor sequences themselves were distinguished. The knowledge (and by implication, the interest) associated with the more recently de-orphanised GPCR means that reviews describing them are much less likely to accumulate citations. Given the focus of NC-IUPHAR papers in *Pharmacological Reviews* on nomenclature issues, there will be a time when all the GPCR, nuclear hormone receptors and ion channels have been systematically named through this journal.

The relationship with the *British Journal of Pharmacology* is much more recent, although we have managed to publish 23 articles over six years (Figure 3). The basis for these articles are elements beyond 'simple' nomenclature, with examples covering updates on established drug targets, where the nomenclature is very well established. As might be expected, the more recent series of reviews in BJP have not accrued the phenomenal numbers of *Pharmacological Reviews*. In fact, there is a total of 435 citations (Figure 4), allowing calculation of a mean number of citations of a very respectable ~26 per publication. The first publication, authored by the late, great Tony Harmar and colleagues on VIP & PACAP receptors has accumulated over 110 citations.

We are currently planning the pipeline of publications for the next two years in an attempt to maintain the output of NC-IUPHAR at the same high standards. The full list of NC-IUPHAR publications is available at www.guidetopharmacology.org/nciupharpublications.jsp. We would like to thank all of the 579 authors who have contributed to the 124 reviews, particularly the top three, Michael Spedding, Tom Bonner and Anthony Davenport. In addition, Eliot Ohlstein is to be thanked for his role as editor for many years. •

Steve Alexander

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30 YEARS OF NC-IUPHAR (CONTINUED)

overexpression in artificial systems, was stopped by recommending rigorous criteria, particularly requiring the demonstration in native tissue.

Genesis and expansion of the database

The initial compendia quickly demonstrated how useful collated data were, and allowed the first attempts at organising tabulated, highly curated data. Tony Harmar offered to host the first database at the University of Edinburgh. Support from a biotechnology company, Incyte, the International Council for Science, and the pharmaceutical group, Servier, supplemented the limited IUPHAR funds to underwrite the initial database. The first attempt conjointly with the European Bioinformatics Institute yielded complicated specifications too unwieldy to be efficient. So, Tony developed a much simpler MySQL database (IUPHAR-DB.org), which has stood the test of time.

Then followed a very productive expansion period growing the subcommittees to their current levels. Eliot Ohlstein was appointed editor to oversee the ever-increasing number of articles, which were then followed up by database releases on the receptor system in question. A great synergy was obtained by inviting the editors of the *British Journal of Pharmacology* 'Guide to Receptors and Channels' (GRAC) and the editor-in-chief, John (Ian) McGrath, to NC-IUPHAR meetings. This eventually led to the fusion of IUPHAR-DB and GRAC into the IUPHAR/BPS guidetopharmacology.org, with a paper version similar to GRAC being published as the Concise Guidetopharmacology. Funding from the Wellcome Trust made it possible to include the sites of action of all marketed drugs. The guidetopharmacology.org is accessed by over 160 countries and is prioritised by the British, Indian, American, Australian, and Chinese Pharmacological Societies.

Unfortunately, this phase was shadowed by the untimely passing of Tony, at which point Jamie Davies at the University of Edinburgh took on management of the database team. IUPHAR will be forever indebted to Tony Harmar and grateful to Jamie Davies. The meetings are a continual unveiling of scientific progress. Those of us who have worked on calcium-channels when any thought of molecular structure was considered science fiction, have seen the channels evolve

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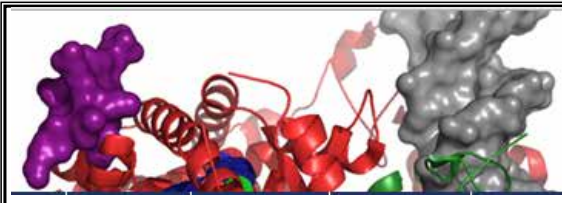
L→R: Michael Spedding, Tony Harmar and Ian McGrath

Most of the participants in the NC-IUPHAR meeting held in Edinburgh during April, 2013



IUPHAR/BPS
Guide to PHARMACOLOGY

What drug concentration do I use?

New interactive activity charts to find pharmacology parameters across species in IUPHAR/BPS Guide to Pharmacology

A key requirement in biomedical research is to identify tool compounds such as agonists and antagonists to characterise particular targets, and secondly to calculate concentrations required to achieve a specific pharmacological action. It is also crucial to know whether there are any differences between species, particularly for translational research, and whether ligands are selective or activities at other targets have been reported. The IUPHAR/BPS Guide to PHARMACOLOGY database (GtoPdb, http://www.guidetopharmacology.org) has recently introduced interactive charts (developed by JS) of pharmacological parameters across species, where these data exist for ligands in GtoPdb and ChEMBL. Many pharmacology parameters are reported in the results section of papers and may not appear in the summary, so cannot be easily found in databases such as PubMed. The new interactive graphs on GtoPdb have been designed to quickly summarise this information. Entering a compound name via the 'Search Database' box at the top of the page, clicking on the ligand, and then selecting the 'Biological Activity' tab reveals a new link: **View interactive charts of activity data from ChEMBL and GtoPdb across species** (Figure 1).

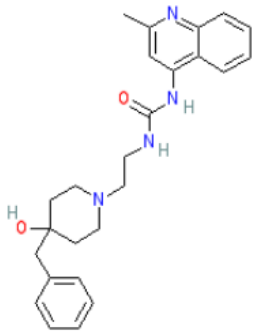
palosuran

Ligand id: 3516

Name: palosuran

Structure and Physico-chemical Properties

2D Structure



Calculated Physico-chemical Properties

Hydrogen bond acceptors	6
Hydrogen bond donors	3
Rotatable bonds	8
Topological polar surface area	77.49
Molecular weight	418.24
XLogP	5.78
No. Lipinski's rules broken	1

Molecular properties generated using the CDK

Summary | Biological activity | References | Structure

View interactive charts of activity data from ChEMBL and GtoPdb across species (New!)

Selectivity at human GPCRs

Key to terms and symbols — Click column headers to sort

Target	Type	Action	Affinity	Units	Reference
UT receptor	Antagonist	Antagonist	7.1	pIC_{50}	1

Figure 1. Palosuran ligand page on GtoPdb, open at the Biological Activity tab showing the link to interactive charts of bioactivity data from GtoPdb and ChEMBL.

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What drug concentration do I use? *(continued)*

This displays an interactive chart of pharmacological parameters expressed as -$\log_{10}$ that are associated with the compound, extracted in real time so the graph always reflects the most recent update from the 8900 entries in GtoPdb and 1.6m in ChEMBL. For functional assays, affinity values may include pIC_{50} or pEC_{50} values of agonists; pA_2 or pK_B values for antagonists. For ligand binding assays, affinity values may be reported as pK_d, pK_i or pIC_{50}. For definitions of pharmacological parameters see NC-IUPHAR's terms and symbols publication.

The example (Figure 2) shows results for palosuran (ACT-058362), a small molecule urotensin II receptor antagonist. Hovering the mouse over the chart on a particular datapoint gives the median and range if more than one value is reported for the parameters shown on the horizontal axis. In the example, the results show the IC_{50} value for palosuran inhibition of binding was about ~5000 fold lower in rats compared with humans, showing a significant discrepancy between the two species. Further information can be obtained from the references below the graph, which can read by opening the PubMed link for parameters derived from either GtoPdb or ChEMBL. Zero indicates no data associated with this parameter in either database. Alternatively, if the target is known, searching using for example 'urotensin receptor' will list all the urotensin ligands including palosuran – selecting 'palosuran' will lead to the interactive chart.

DB	Assay description	Assay Type	Standard value	Standard activity	Original value	Original units	Original activity	Reference
UT receptor/Urotensin II receptor in Human (target type: SINGLE PROTEIN) [ChEMBL: 10927] [GtoPdb: 365] [UniProtKB: Q9UKP6]								
ChEMBL	Displacement of [125I]urotensin 2 from urotensin 2 receptor in human RMS13 cells by scintillation proximity assay	B	7.39	pKi	41	nM	Ki	J. Med. Chem. (2009) 52: 7432-7445 [PMID:19731961]
ChEMBL	Antagonist activity at urotensin 2 receptor in human RMS13 cells assessed as inhibition of urotensin 2-induced intracellular calcium mobilization after 1 hr by FLIPR assay	F	6.49	pIC50	320	nM	IC50	J. Med. Chem. (2009) 52: 7432-7445 [PMID:19731961]
ChEMBL	Antagonist activity at recombinant human urotensin2 receptor expressed in CHO cells assessed as inhibition of urotensin2-stimulated Ca2+ mobilization incubated 10 mins prior to urotensin2 stimulation measured after 10 mins by fluorometric analysis	B	7.41	pIC50	39	nM	IC50	Bioorg. Med. Chem. Lett. (2013) 23: 2177-2180 [PMID:23453841]

Figure 2. Chart of activity data for palosuran showing species difference between rat and human. Source databases and references are given below in a table, along with the original data and the -$\log_{10}$ value.

GtoPdb contains curated information provided by over 850 biomedical scientists who are experts in their field and this database is recommended for identifying key tool ligands for a particular target. Visit the website for full details on the coverage of targets and ligands in the latest version. ChEMBL contains pharmacological parameters from a range of eclectic

Continued on page 13...

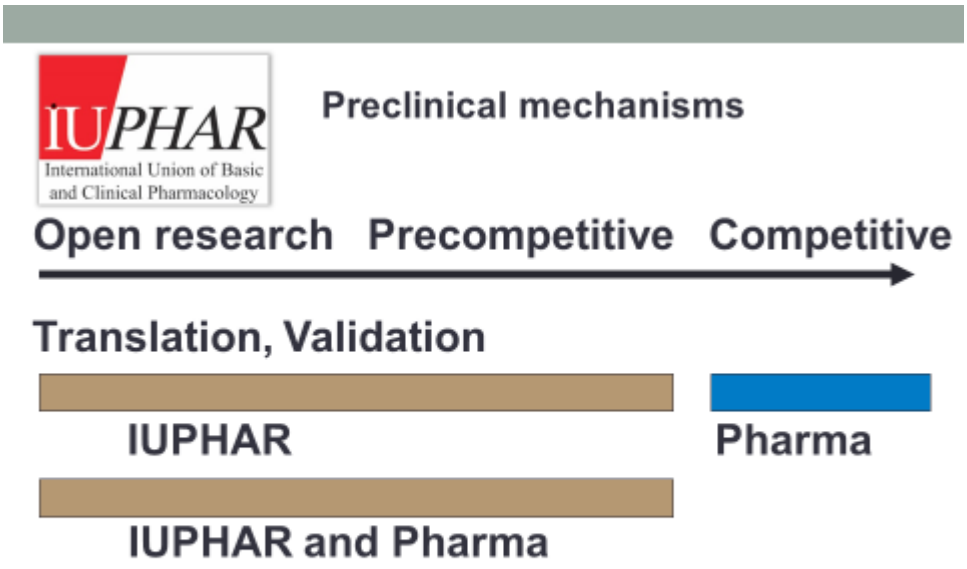
What drug concentration do I use? (continued)

sources, particularly chemistry papers where a series of compounds may be reported but not necessarily with extensive pharmacological validation. Screening data are also included, that may represent a single hit in a high throughput screen, but could be the starting point to develop a tool ligand for a novel target, perhaps identified by RNA sequencing or other techniques. Screens against parasites and other vectors are also reported. For example, the D_2 dopamine agonist sulpiride has surprisingly high affinity in *Anopheles gambiae*, so perhaps efficacious in depressed or anxious mosquitos. Information can also be obtained about selectivity (or lack of it) for a particular ligand: montelukast (leukotriene receptor antagonist with selectivity for $CysLT_1$ receptor) has activity associated with over 20 other targets, depending on the concentration used.

A current limitation is that ligands must have a ChEMBL identifier on GtoPdb. Currently these are missing for a number of ligands, particularly complex molecules such as peptides and monoclonal antibodies, as it is difficult to determine equivalent database molecular structures. These will not display interactive charts although data are usually present in GtoPdb and may also be present in ChEMBL. We are hoping to solve this in a future version by converting peptide sequences to SMILES strings, a standard format used to describe chemical structures. •

Joanna L. Sharman and Anthony P. Davenport
On behalf of the GtoPdb curators (curators@guidetopharmacology.org)

from rectangles and squiggles with postulated binding sites, to the precise structure with a molecular mechanism for voltage-gating and clearly defined binding sites.



An opportunity to contribute to a global initiative in clinical and preclinical healthcare and education, bridging the gap between preclinical molecular targets, translational medicine, clinical pharmacology, and aid pharmacology in developing countries.

Funding

In the early days, the pharmaceutical industry supported much of the costs. Paul Vanhoutte and Sol Langer were able to raise funds from Servier and Sanofi respectively, and Servier has contributed throughout the decades. Despite these sources, there was no conflict of interest as only validated (repeated) publications are used (process illustrated at right). Nevertheless, there has never been much financial stability and almost every meeting has featured a 'doom and gloom' budget presentation. An anonymous benefactor donated 250,000£, which demonstrates the utility of the organisation.

Following the database development grants from Incyte and the International Council of Science, two recent Wellcome Trust grants and financing of two key curators for five years by the British Pharmacological Society have introduced a measure of financial stability. IUPHAR has also directly financed the database from its operational budget, thanks to the dues paid by member pharmacology societies. The availability of more curators has led to a revolution in the efficiency of the committee and the database. Adam Pawson now serves as the executive secretary for direct contact with the subcommittees. Joanna Sharman continues to lead and coordinate the technical issues relating to the database. Thus, a dynamic team of five curators run the IUPHAR/BPS guidetopharmacology.org on the mechanism of action of all drugs. Thanks to renewed funding from the Wellcome Trust that allows funding of specialised curators, the inclusion of all immunological targets is currently underway.

Continued on page 16...

IUPHAR Guide to IMMUNOPHARMACOLOGY beta v1.0

An Update

The Guide to IMMUNOPHARMACOLOGY (GtoImmuPdb) had its first, public, beta-release in May 2017. GtoImmuPdb is a Wellcome Trust-funded extension to the existing Guide to PHARMACOLOGY (GtoPdb) (www.guidetopharmacology.org) and this release marks an important milestone is its production and development. GtoImmuPdb aims to provide improved data exchange between immunology and pharmacology expert communities, so to better support research and development of drugs targeted at modulating immune, inflammatory or infectious components of disease. The underlying GtoPdb schema has been extended to incorporate new immune system specific data types (such as processes, cell types and disease) and the GtoPdb website has been developed to surface this new data and incorporate it into the existing search and browse mechanisms. A new Guide to IMMUNOPHARMACOLOGY portal (www.guidetoimmunopharmacology.org) has been developed, which serves as a unique immunological access-point to the Guide to PHARMACOLOGY (Figure 1).

Figure 1: The GtoImmuPdb portal, www.guidetoimmunopharmacology.org

Continued on page 15...

The GtoImmuPdb Update (continued)

The GtoImmuPdb enriches the existing GtoPdb by flagging targets and ligands of immunological relevance and linking these targets to immunological process, cell types and relevant diseases. In terms of processes and cell types, GtoImmuPdb has developed top-level categories, that aim to be meaningful and intuitive to immunologists, against which targets and ligands in the database can be annotated. These categories are then underpinned by the use of both the Gene Ontology and the Cell Ontology. Using recognised ontologies provides a controlled vocabulary for higher resolution annotation. It also facilitates interoperability between new data types in GtoImmuPdb and external resources that also use these ontologies.

The web-interface has been designed to provide a unique 'GtoImmuPdb view' of the data, highlighting content of immunological relevance and prioritising immunological data in search results and display. It includes features that highlight ligands of immunological relevance by use of a GtoImmuPdb icon (Figure 2); toggle buttons to enable the GtoImmuPdb view to be switched on and off; and new pages to browse the new immunological data types (Figure 3).

Agonists

Key to terms and symbols — Click column headers to sort

Ligand	Sp.	Action	Affinity	Units	Reference
CCL11 {Sp: Human}	Hs	Full agonist	9.7 – 10.0	pK_i	14
CCL11 {Sp: Mouse}	Hs	Full agonist	9.5 – 10.0	pK_i	14
CCL5 {Sp: Human}	Hs	Full agonist	8.5 – 9.3	pK_i	14
CCL7 {Sp: Human}	Hs	Full agonist	8.6 – 9.2	pK_i	14
CCL2 {Sp: Human}	Hs	Full agonist	7.2 – 7.8	pK_i	14
CCL13 {Sp: Human}	Hs	Full agonist	8.7 – 10.3	pIC_{50}	32,42
CCL11 {Sp: Human}	Hs	Full agonist	8.7 – 9.0	pIC_{50}	15,28,32,39,42

Figure 2: Showing how the new GtoImmuPdb icon displays against ligands within the interaction data for a target

Development of the beta-release is ongoing with regular updates planned over the next few months as the quantity of data captured increases and improvements in the site layout and function are made. We recently held our bi-annual project meeting in Edinburgh and were able to gain a lot of valuable feedback on the resource, in particular in how best to categorise processes and cell types to be of most use to immunologists. We also had some great input on ways to improve the user experience in terms of how to search for data and to provide better ways to browse data using schematic images. One of our priorities over the next 6 months is to undertake rigorous site testing with interested user groups to capture more insight and feedback. •

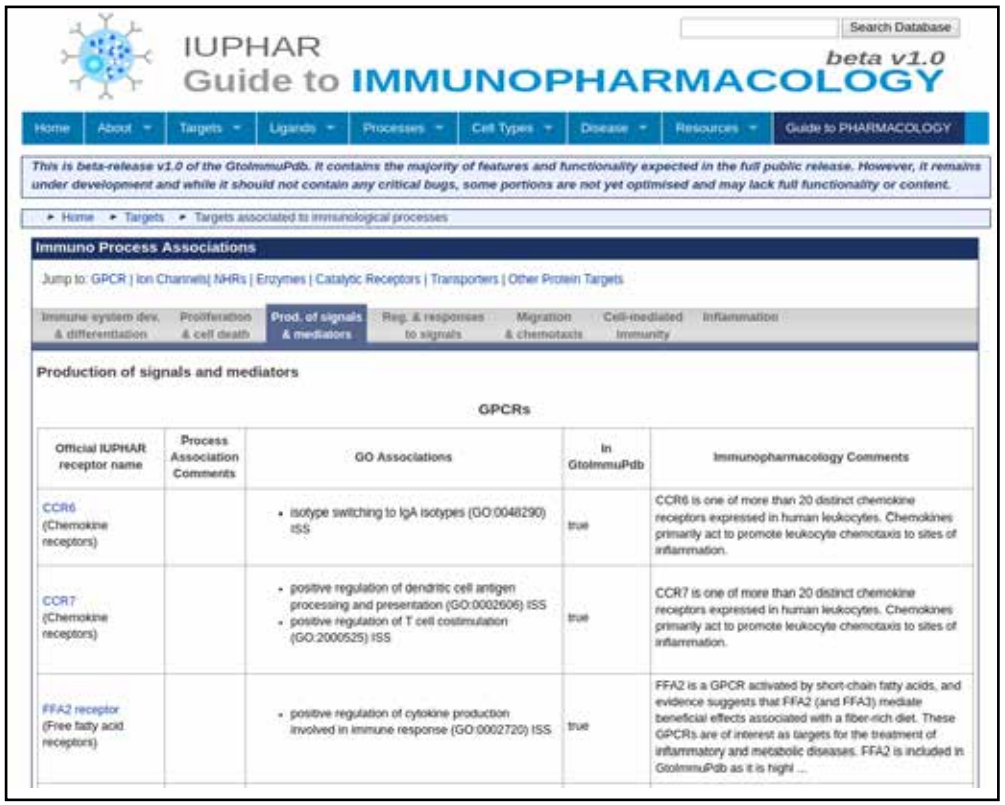


Figure 3: GtoImmuPdb display of targets associated with immunological processes

Simon D. Harding
On behalf of the GtoPdb curators (curators@guidetopharmacology.org)

Pharmacology International

June 2017

30 YEARS OF NC-IUPHAR (CONTINUED)

IUPHAR is proving itself as a good arbiter of research questions in the multiple areas of drug targets and therapy - what we know and don't know - with a synergy between industry and academia. The network of experts means that very complicated questions can be addressed. This initiative is timely because the world is awash with scientific data, but its interpretation for therapeutic benefit lags far behind. IUPHAR provides a precompetitive level playing field for collaboration between pharmaceutical industry, biotechs and academics as shown by the recent and ongoing extensions into defining what we know and don't know by expert subcommittees in:

- Orphan and Rare Diseases (in collaboration with Orphanet)
- Antibodies (in collaboration with the ImMunoGeneTics Information System)
- Immunopharmacology
- Kinases
- Proteases and hydrolases
- Epigenetic targets
- Natural products
- Allostery
- Alternative Splicing

NC-IUPHAR therefore has a proven ability to integrate highly complex data using experts working for the common good, around scientific articles and websites of consensus. This is a unique cooperative, feed-forward venture, which has been recognised by the Interational Council for Science and the United Nations Educational, Scientific and Cultural Organization (UNESCO). NC-IUPHAR could be a model for inserting science into other human activities, linking expert-monitored databases to guidelines relevant to society. •

Michael Spedding and Steve Alexander
On behalf of
Tony Harmar, Paul Vanhoutte, Bob Ruffolo, Sir Colin Dollery, Bill Catterall, Jamie Davies, Adam Pawson, Joanna Sharman, Eliot Ohlstein, Anthony Davenport, Doriano Fabbro, Arthur Christopoulos and the all of the NC-IUPHAR volunteers

Most of the participants in the NC-IUPHAR meeting held in Edinburgh during April, 2017

IUPHAR Welcomes a New Member!

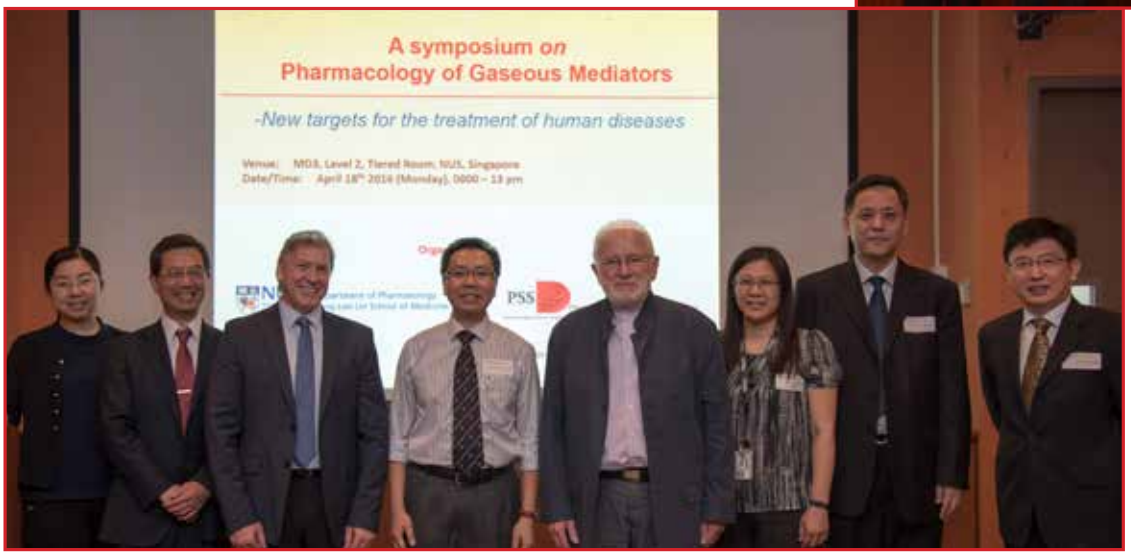
An Overview of the Pharmacological Society *of* Singapore

In the year 2015, we saw the birth of the Pharmacological Society *of* Singapore, (PSS), the newest member of IUPHAR, founded by a group of faculty members from the Department of Pharmacology, Yong Loo Lin School of Medicine of the National University Health System. With a mission to promote basic and clinical pharmacological science in teaching and research within Singapore, the PSS started from an initial enrolment of 85 members. It quickly grew in strength with a number of members joining the Society from many institutions in Singapore beyond the Department of Pharmacology, including the Departments of Pharmacy and Physiology, and the Cancer Science Institute, as well as members from other universities, institutes of higher learning and the biomedical industry.

<u>Promoting Pharmacological Research</u>

From inception, the PSS promptly set out to leave a mark both within its borders as well as regionally and internationally. For instance, drawing from one of the research strengths of the region, the PSS co-organized the "IUPHAR World Conference on the Pharmacology of National Products and Traditional Medicine" together with the Chinese Pharmacological Society and the IUPHAR Pharmacology of Natural Products Section in Singapore in July 2015, which attracted attendees from the region and as far away as Cuba. The PSS also became a member of the Asia-Pacific Federation of Pharmacologists (APFP) and sent four student members to attend the 13th APFP meeting in Bangkok, Thailand in February, 2016. Also in 2016, the PSS organized a "Symposium on the Pharmacology of Gaseous Mediators" with IUPHAR past president, Prof. Paul Vanhoutte, as the Plenary Speaker.

L→R: Prof. Guanhua Du, president of Chinese Pharmacological Society; Prof Michael Spedding, IUPHAR secretary general; Prof. Ho Teck Hua, deputy president of Research & Technology of the National University of Singapore; Prof. Yongxiang Zhang, general secretary of Chinese Pharmacological Society; and Prof. W.S. Fred Wong, president of Pharmacological Society of Singapore



Invited Speakers for the Symposium on Pharmacology of Gaseous Mediators
Center right is Prof. Paul Vanhoutte, IUPHAR past-president and
center left is Prof. W.S. Fred Wong, president of the Pharmacological Society of Singapore.

Continued on page 18...

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PHARMACOLOGICAL SOCIETY *OF* SINGAPORE

(CONTINUED)

This year we look forward to welcoming IUPHAR secretary general, Prof. Michael Spedding, as the Plenary Speaker for the upcoming "Scientific Frontiers in Natural Product Based Drugs" conference in Singapore in July, 2017 (www.pharmconf.org). Looking ahead, the PSS will also be organizing a themed session for the World Congress of Basic and Clinical Pharmacology to be held in Kyoto, Japan in July, 2018.

Education and Outreach

Apart from promoting research, the other drivers of the PSS are Pharmacology Education and Outreach to promote deeper engagement in society at large. To encourage scientific exchange and improve communication skills for pharmacology students, the PSS holds the annual Graduate Academic Progress in Pharmacology (GAPP) meeting where student members presented their research works in the rapid-fire presentation style, and discussed their research projects with fellow students and faculty members, in an informative and interactive setting. The PSS also organizes "Career Day" workshops inviting pharmacologists from research, academia and industry sectors to share their career insights and experiences with the students. Last but not least, to broaden the horizon of our students in pharmacological science, the PSS awards Student Travel Scholarships every quarter to support student members to attend regional pharmacological conferences.

PSS: A Small Society with Big Ideas

Geographically located in one of the smallest countries in the world and surrounded by lush green rainforests as well as urban centres of South and Southeast Asia, we are committed to furthering our mission towards pharmacological research. We plan to especially focus on areas where our region has relative strength and advantage, like natural product therapeutics, education and outreach both regionally and internationally. Under the leadership of our committed Council comprised of the president, Prof. W.S. Fred Wong, vice president, Prof. Gavin Dawe, honorary secretary, Prof. Gautam Sethi, and treasurer, Dr. Mitchell K.P. Lai, we very much look forward to working with IUPHAR and our sister societies in the region to achieve these goals.

For further information, visit our website at http://www.pharmacologicalsociety.sg . •

W.S. Fred Wong
Gavin Dawe
Gautam Sethi
Mitchell K.P. Lai

The Council for International Organizations of Medical Sciences Announces a New Working Group on Drug-Induced Liver Injury

The Council for International Organizations of Medical Sciences (CIOMS) is an international, non-governmental, non-profit organization established in 1949 jointly by the World Health Organization and the United Nations Educational, Scientific and Cultural Organization. The IUPHAR Clinical Pharmacology Division is a member of CIOMS so will periodically bring to your attention initiatives that are of direct influence on the discipline of pharmacology.

The incidence of drug-induced liver injury (DILI) is a growing challenge because of the ever-increasing number of drugs used in medical care. It is responsible for more than 10% of all cases of acute liver failure, posing a major clinical and regulatory challenge. In a recent and well-executed population-based study, the crude annual incidence of DILI was 19.1 cases per 100,000 persons (95% CI, 1.54-23.3). In many instances, the hepatotoxic potential of a drug can only be recognized post-marketing, and DILI is one of the most frequent reasons for marketed drug withdrawal and modification of labelling. The clinical pattern of DILI is diverse and can mimic almost any form of liver disease, ranging from asymptomatic elevation in aminotransferases to severe diseases such as cirrhosis or acute hepatitis leading to acute liver failure, making it difficult for an easy and early diagnosis. It remains largely unpredictable and is not amenable to efficient preventive measures.

Being an important cause of mortality and liver transplantation and a leading cause of attrition in drug development, DILI remains a public health issue of great importance, which needs additional international consensus guidance. After exploring interest among key stakeholders, CIOMS has decided to launch a new Working Group composed of academia, industry and regulatory partners to address the present knowledge and practice gaps related to DILI in order to formulate pragmatic consensus-based recommendations to address the major outstanding issues. Furthermore, collaborative efforts aimed at capitalizing on existing initiatives will also be a part of the Working Group in order to provide output that is as comprehensive as possible. The first meeting of the Working Group was held 27-28 April 2017 in Geneva.

Professor María Isabel Lucena at the Málaga, Spain IUPHAR Clinical Pharmacology Mentoring Center represents IUPHAR on the DILI Working Group. For more information, visit http://www.iuphar.org/files/Clinical%20Division/Malaga_Mentoring_Center.pdf or www.cioms.ch.

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June 2017

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'Pharmacology for Africa' initiative
Pharmacologie pour l'initiative de l'Afrique

www.iuphar-africa.org

Advancing medicine research for effective health care

2016 All Africa Congress of Pharmacology and Pharmacy

"Evidence in Action"

Muldersdrift, the "Cradle of Humankind", South Africa

5 - 8 October 2016

Africa and the world pharmacology focused on the "Cradle of Humankind" just a few miles away from Johannesburg, South Africa in October, 2016 to experience the excitement and scientific excellence of the 2016 All Africa Congress of Pharmacology and Pharmacy in truly African tradition (above photograph). Delegates were treated to a feast of celebrations for the 10 year anniversary (2006 - 2016) of Pharmacology for Africa (Pharf*A*), the second Pharf*A* Prestigious Lecture, presented by Prof. Mohamed Khayyal (Egypt), as well as the remarkable 50 year anniversary (1966 - 2016) of the South African Society of Basic and Clinical Pharmacology. Pharf*A*, the South African Society of Basic and Clinical Pharmacology, the Academy of Pharmaceutical Sciences, and the Toxicological Society of South Africa collaborated to organize the largest All Africa Congress held to date. Sefako Makgatho Health Sciences University and Tshwane University of Technology hosted the event under the outstanding leadership of Drs. Wim du Plooy and Ilse Vermaak (South Africa). The congress theme of "Evidence in action" could not have been better chosen in view of the healthcare needs of the African continent.

More than 350 delegates (photographs at right and below), including representatives from Egypt,

Continued on page 22...

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2016 All Africa Congress of Pharmacology and Pharmacy
(continued)

Eastern, Western and Central Africa as well as Sub-Saharan Africa, presented outstanding basic and clinical research emanating from investigations from some 20 countries amongst others the USA, UK, France and India. The presidents and representatives of the African pharmacological societies made vital contributions to the success of the All Africa Congress. The scientific programme offered participants a broad range of topics pertinent to clinical pharmacology, general toxicology, basic pharmacology, herbal pharmacology, pharmaceutical chemistry, pharmacoeconomics, pharmaceutics, pharmacy practice, pharmacy education and regulatory science. The plenary lectures and parallel scientific sessions were accompanied by informative workshops. The all-important area of antibiotic stewardship was featured in a clinical workshop. The IUPHAR Integrated Organ Systems Pharmacology (IOSP) training sessions on pre-clinical methodologies were presented to young investigators under the leadership of Profs. Dave Lewis (UK) and Anne Grobbelaar (South Africa).

Phar*f*A was privileged to have Prof. Mohammed Khayyal (Egypt) deliver the second Phar*f*A Prestigious Lecture. The First Lecture was presented during the 2014 World Congress of Basic and Clinical Pharmacology in Cape Town. Prof. Khayyal is a renowned pharmacologist in the field of inflammation and gastrointestinal pharmacology, with over 50 years of experience and 100 publications. Prof. Khayyal is the president of the Egyptian Society of Pharmacology and Experimental Therapeutics and is actively engaged with numerous international scientific societies. He has been the recipient of several prestigious fellowships, such as the International Atomic Energy Agency, Austria; the Alexander von Humboldt Foundation, Germany; and the Fulbright Fellowship, USA.

Profs. Mohammed Khayyal (at left) and Alexander Dodoo

The All Africa Congress scientific session sponsored by Phar*f*A was chaired by Prof. Douglas Oliver (South Africa) and featured outstanding pharmacologists from Africa:

Prof. Alexander Dodoo (Ghana) *Adaptive approval pathways for new vaccines and medicines for human use: Shouldn't Africa lead the way?*

Prof. Alaaedin Elkoussi (Egypt) *Solvent inhalants remarkably alter brain neurotransmitter*

Prof. Eyasu Makonnen (Ethiopia) *Genome-wide association and replication study of anti-tuberculosis drugs-induced liver toxicity*

Prof. Claude Kirirmuhuzya (Uganda) *Towards the integration of conventional and traditional medicines in Africa: A case for Uganda*

The Phar*f*A symposium speakers emphasized issues relevant to pharmacologists for advancing health care on the African continent.

The Phar*f*A 2016 General Assembly was convened in conjunction with the Congress, where the participants discussed goals for the second decade of Pharmacology for Africa. They urged the pharmacological science societies to focus on benefits for both young and established pharmacologists. The group prioritized seeking out opportunities to advance continental networking and expertise exchanges. Establishing country-wide and regional societal structures for pharmacology were recommended as was increasing global participation of Phar*f*A and its members, such as IUPHAR World Congresses. It was agreed that the next All Africa Congress should take place in East Africa. Additional sustainability strategies were outlined to ensure Phar*f*A can grow its activities and advance pharmacology on the continent.

The African sunset created a perfect backdrop to kick start the October 6th festivities for the 10th anniversary of Phar*f*A with a large number of delegates representing many countries.

Continued on page 23...

2016 All Africa Congress of Pharmacology and Pharmacy
(continued)

Photograph at right: Some of the All Africa Congress organizers L→R: Douglas Oliver, Bernd Rosenkranz, Tiaan Brink and Wim du Plooy

Photograph below: Banners represented the All Africa Congress theme and major partners. At far right is the new PharfA banner, which was designed in honor of the upcoming second decade. It was showcased at the All Africa Congress to help underscore the strategic areas that PharfA will pursue to advance pharmacology and to benefit pharmacologists.

From humble beginnings in China in 2006, African pharmacologists joined hands to win the congress bid that launched a 10 year journey. Phar*f*A is now recognised in countries, on the continent, and globally as the strong network needed to advance pharmacology and the related disciplines on the African continent for both the young and established pharmacologists. Congratulatory messages were received from the IUPHAR president, Dr. S.J. Enna, and the past president, Dr. Paul Vanhoutte, as well as the presidents of pharmacological societies in Africa, UK, Europe, Australia and Asia. The Phar*f*A co-founders, Profs. Douglas Oliver and Christiaan Brink, welcomed all in attendance. As the current Phar*f*A chair, Prof. Oliver highlighted some of the notable milestones, such as delivering successful training workshops for younger generation scientists; the funding that helped about 400 delegates across Africa participate in the 2014 World Congress of Basic and Clinical Pharmacology; increased participation of African pharmacologists in continental and global conferences; and the on-going interactions of Phar*f*A with various governmental and industry stakeholders. Prof. Oliver thanked the audience for their support during the first decade and invited their continued enthusiasm as PharfA continues its mandate into a second decade. The celebration was a rare opportunity to convene so many African pharmacologists in one place at one time for networking and camaraderie.

Continued on page 24...

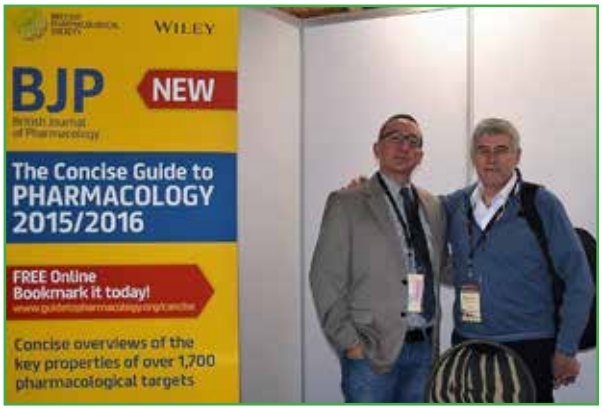
Pharmacology International

June 2017

2016 All Africa Congress of Pharmacology and Pharmacy
(continued)

The successes from the first decade of Pharf*A* ignited a high-energy start to the second decade. It resulted in the mandate of *Advancing medicine research for effective health care across the African continent*. To better align with the recent exciting developments, the Pharf*A* website at http://iuphar-africa.org is being updated. The contents will soon be available in English, French and Portuguese. The All Africa Congresses and developmental events for next generation scientists will form the core strategy to build capacity. The events are envisaged to be hosted in East-, North- and West-Africa over the next decade. Increasing efforts will focus on building country and regional societal pharmacology structures. Global interactions for Pharf*A* and its members are critical so participation in the IUPHAR World Congresses of Basic and Clinical Pharmacology in Kyoto during 2018 and in Glasgow during 2022 will be excellent opportunities to showcase the research activities of Africa. Pharf*A* proposals for the 2018 World Congress of Basic and Clinical Pharmacology are well underway and include scientific sessions, the Third Pharf*A* Prestigious Lecture, and the Pharf*A* General Assembly.

Pharmacology for Africa is most grateful to the numerous organisations, funding agencies, pharmacology societies across the world, and industry representatives that offered support during its first decade. The success of the 2016 All Africa Congress was also made possible by the support of many organisations. Pharf*A* wishes to express sincere appreciation to the British Pharmacological Society for the generous funding that enabled Pharf*A* to sponsor several young and established researchers from Africa to present their research at the All Africa Congress in addition to recording presentations to pod- and broadcast online. The *British Journal of Pharmacology* and IUPHAR receive thanks for empowering researchers in Africa with the research materials provided in the Concise Guide to PHARMACOLOGY along with the freely accessible online database at www.guidetopharmacology.org. The young pharmacologists thoroughly enjoyed the wristband memory sticks containing the Concise Guide to PHARMACOLOGY distributed at the Congress. The support of the South African National Convention Bureau, the pharmaceutical industry, and the exhibitors is acknowledged and appreciated. Moreover, the Potchefstroom campus of the North West University, the South African Department of Science and Technology, and the DST/NWU preclinical drug development training platform (IOSP workshop) were amongst other stakeholders that supported the event. All these efforts made the All Africa Congress a memorable and remarkable event on the calendar of Pharmacology for Africa.



Dr. Adam Pawson, Senior Database Curator of the Guide to Pharmacology (at left) with Prof. Douglas Oliver

The debates and lively engagements during the sessions of the All Africa Congress were a true reflection of the outstanding contributions by pharmacologists on the continent. The passion, enthusiasm and excitement of the delegates during the social events were in true African spirit with the rhythm of the drums beating well into the early hours of the morning. With the dawn of the second decade, Pharf*A* dreams of strengthening partnerships within the continent and extending the reach of African pharmacologists across the world is clearly visible as the sun rises over Africa. ●

Douglas Oliver
PharfA Chair
and Co-founder

Makhotso Lekhooa

Section for Clinical Pharmacology of the Serbian Medical Society Hosts Symposium VIII - Hospital Clinical Pharmacology Week

VIII Hospital Clinical Pharmacology Week (WHCP), the annual symposium organized by the Section for Clinical Pharmacology of the Serbian Medical Society (SCP-SMS), was held 26 – 27 November 2016 in Belgrade. Specialists, young medical doctors, future clinical pharmacologists and colleagues of all medical specialties attended WHCP (audience pictured at right). WHCP focused on the integration of science and profession, carried out through oral presentations, posters presentations, and industry lectures by Galenika (a pharmaceutical company based in Belgrade) and GlaxoSmithKline.

The welcome speeches were given by the Chair of the Serbian Medical Society, Academic Prof. dr. Radoja Colovic, and the Assistant Minister of Health for public health and healthcare programs, dr. Vesna Knjeginjić. We are proud of our past assessment work, as well as the support we receive from prominent colleagues at the top of the health pyramid, whose reputations help us achieve success in the ongoing development of clinical pharmacology as medical specialty. In particular, we want to acknowledge the participation of our younger physician colleagues, drs. Srdjan Z. Markovic (on the left side of the photograph at right with President Kastratovic), Ana Tomas, Marijana Perić, Nemanja Rancic and Dane Krtinić, who have expressed their interest in pursuing clinical pharmacology as a career path.

Plenary sessions are always dedicated to the latest clinical pharmacology trends so this year's session focused on personalized clinical pharmacology. Although personalized medicine has been slow to integration, we enjoyed discussing this hot topic because it is a logical progression of clinical pharmacology. Younger doctors accept this phenomenon as a natural course of pharmacotherapy development and the specifics and regulations in clinical trials are normal extensions of clinical pharmacology standards. See page 26 for the program. The second day of WHCP addressed various hospital issues. The invited speakers were physicians representing the Serbian cities where clinical pharmacologists are employed - Belgrade, Novi Sad, Kragujevac, Nis, Sabac, Uzice, and Valjevo.

The relationship between the State and our discipline is slowly changing by virtue of the government coming to understand the importance of clinical pharmacology to the population, in general, and the contributions that we as a professional cohort can offer, in particular, by prescribing safer, more efficient and cheaper therapies. Careful analyses and training are key to identifying the therapeutics that can offer patients a better quality of life. A vital challenge is the extremely low number and/or lack of clinical pharmacology specialists within Serbia. The first step has been made with the government officially recognizing our special line of work as a scarce resource. The SCP-SMS is optimistically working towards the next step, the creation of federal grants to recruit medical school graduates who have already demonstrated an interest in clinical pharmacology.

We all appreciate that the best cures require multidisciplinary approaches, so such solutions rarely originate solely from the drug manufacturing companies. Hence, we contribute to this iterative process by respecting the principles of good clinical, research and prescribing practices. To achieve these goals, we need to recruit next-generation doctors and establish new and/or expand existing laboratory capacity. To improve our effectiveness, we are developing regional clinical pharmacology centers that will orchestrate the educational activities and training to yield the most effective patient therapies, clinical drug testing, pharmacoeconomics, and monitor the ongoing consumption rates of drugs.

The goal of the SCP-SMS is to assist doctors to understand, and work in accordance with, the highest quality standards of treatment. Having 30 years of experience in clinical pharmacology, I am confident that additional investment by the State to develop the discipline of clinical pharmacology will be cost-effective both in terms of higher levels of prescribing the most efficient therapies for patient health and comfort while decreasing treatment costs.

We are thankful to IUPHAR and EACPT for being knowledgeable resources and providing support.

Dragana A. Kastratovic - Maca, President, SCP-SMS

Continued on page 26...

Hospital Clinical Pharmacology Week
(continued)

Program at a Glance

Day 1

- *An eight-year analysis of the Section for Clinical Pharmacology of the Serbian Medical Association* by Dragana A. Kastratović, Momir Mikov, Slobodan Janković, Boris Milijašević, Srdjan Z.Marković, Radmila Veličković, Mira Vuković, Viktorija Dragojević Simić, Branka Terzić, Biljana Radojević, Ivana Timotijević, Biljana Savić, Aleksandar Rašković, Mihajlo Jakovljević, Biljana Radojević, Ivana Miličević, Snežana Panić, Tijana Nešić
- *Personalized clinical pharmacology in hospitals* by Dragana A. Kastratović (top photograph at right), Srdjan Z. Marković, Branka M. Terzić
- *Personalized pharmacotherapy in nephrology* by Radmila M. Veličković-Radovanović (second photograph at right)
- *Individualizing drug therapy in a resource-poor settings of developing countries: Examples from practice* by Slobodan M. Janković (third photograph at right)
- *Bioequivalency of highly variable drugs: State of the art* by Viktorija M. Dragojević-Simić (fourth photograph at right), Aleksandra Kovačević, Nemanja Rančić, Zoran Šegrt, Vesna Jaćević, Momir Mikov
- *Bioequivalence in personalized clinical pharmacology* by Zoran M. Todorović (fifth photograph at right), Dragana D. Protić
- *Introduction for translational medicine* by Aleksandra Pešić

Day 2

- *When stress alarm becomes a sign for alert in a psychosomatic decompensation* by Ivana P. Timotijević (sixth photograph at right) , Mirjana M. Todorović , Katarina B. Crnić , Srdjan Z. Marković, Dragana A. Kastratović
- *Ethical principles in medical procedures advertising* by Mira H. Vuković
- *Food and drug interactions* by Kornelia Djaković Švajcer
- *Guideline of pharmacotherapy number 6, 2016 for healthcare professionals* by Vesela Radonjić, Ljiljana Djukić, Branka Terzić, Nenad Ugrešić, Violeta Stanimirović
- *A report on the role of clinical pharmacologist in drug side-effects* by Aleksandar L Rašković, Nebojša P. Stilinović, Olga J. Horvat, Boris Ž. Milijašević, Ana J. Sabo
- *Spontaneus reporting of suspected adverse drugs reactions in the military-medical academy during 2006-2015* by Aleksandra M. Kovačević, Nemanja K. Rančić, Milijana N. Miljković, Natalija V. Konstantinović, Vladan D. Lukić, Zoran P.Šegrt, Viktorija M. Dragojević Simić
- *Non-chemical addiction: Therapeutic challenges* by Mirjana M. Todorović, Ivana P. Timotijević, Katarina B. Crnić, Srdjan Z. Marković, Dragana A. Kastratović
- *High levels of creatine kinase in malignant neuroleptic syndrome* by Snežana M. Bugarinović, Snežana B. Djordjević, Olivera R. Savić, Veroljub M. Petrović, Ljubinka Nikolić
- *Challenges of pharmacotherapy of depression in patients with type 2 diabetes* by Žana B. Stanković
- The New and Old Europe: East-West split in Pharmaceutical Spending by Mihajlo B. Jakovljević, Marija R. Lazarević, Olivera Z. Milovanović, Tatjana V. Kanjevac
- *Pharmacotherapeutic aspects of usage drugs from group L* by Ana Sabo, Ana Tomas
- Safety, availability and rationality in anesthesia by Branislava Majstorović, Branko Milaković
- Drugs usage in obstructive pulmonary disease by Boris Milijašević, Marijana Macanović, Ana Sabo, Zdenko Tomić, Dragana Milijašević, Nataša Tomić
- *Therapeutic guidelines for substitution treatment in opiate addicts* by Katarina Crnić , Ivana Timotijević, Mirjana Todorović, Srdjan Z. Marković, Dragana A. Kastratović
- *Ultrasonography of head-neck blood vessels in correlation with CT and NMR angiography: Final parameter for therapy decision of cerebrovascular diseases* by Tanja Stričević, Biljana Georgijevski Brkić, Katarina Kačar
- Intrauterine transfusion as therapy procedure by Ljubinka I. Nikolić, Darko V. Plećaš
- Usage of medicines in pregnancy by Branka M.Terzić, Srdjan Z. Marković, Jelena Dj. Grujić
- *Usage of phytomedicines during the pregnancy* by Dajana M. Perić, Aleksandra Nikolić, Boris Milijašević
- Laboratory monitoring Hashimoto disease in pregnancy by Mirjana Petrović, Drina Janković, Marina Stojanov, Milorad Čivčić, Aleksandar Vukadinović, Isidora Tasić
- *Pharmacotherapy in elderly* by Jelena Vuković
- *Antiemetic prophylaxis and treatment in haematological patients* by Dijana M. Šefer, Ana D. Vidović
- *Analysis of the factors affectiong the optimization of rational drug prescribing in elderly patients on hemodyalisis treatment* by Gorana Nedin Ranković, Slobodan Janković, Radmila Veličković Radovanović, Zorica Jović, Gordana Pešić, Dragana Stokanović, Jelena Jovanović, Dane Krtinić
- *Impact on human health effects of toxic bisphenol present in medical devices and their mandatory substitution* by Milena M. Grubor, Srdjan Z. Marković, Dragana A. Kastratović, Marija G. Grubor ●






IUPHAR - SAC ACCP Workshop

On April 30th, the IUPHAR Pharmacoepidemiology and Pharmacovigilance Subcommittee of the Clinical Pharmacology Division organized a workshop in Mumbai, together with the South Asian College, an affiliate of the American College of Clinical Pharmacology. The successful workshop comprised lectures on the topic of drug side effects in the elderly. The first part was moderated by Professors Nilima Kshirsagar (Indian Council of Medical Research, India, on the left in the photograph at right) and Milou-Daniel Drici (University of Nice, France, on the right in the photograph at right) with eminent participants from Croatia, India and the United Kingdom. This was followed by a panel discussion with Indian health authorities, representatives of industry and insurance companies, IUPHAR representatives, and the president of the American College of Clinical Pharmacology.

The initial session, entitled "Managing drug-induced adverse events in the elderly: Can we do better?" was co-chaired by Professors Kshirsagar and Drici. Professor Stephen Jackson (King's College London, UK, photograph at left) reviewed the pharmacokinetic and pharmacodynamic changes associated with ageing, frailty and disease processes. He also considered the definition and limitations of the term "polypharmacy". He argued that appropriate prescribing was a preferable term. He addressed the question of medication review and a systematic approach giving several mindful examples.

Professor Vera Vlahović-Palčevski (University of Rijeka, Croatia, photograph at right) presented a quite comprehensive protocol to mitigate inappropriate medication in the elderly. She defined potentially inappropriate medications (PIMs) as drugs with a potential risk that is higher than their potential benefit, particularly when safer alternative therapies exist. Indeed, most screening tools for detecting PIMs list drugs that should be avoided in the elderly may take into account certain conditions, but rarely offer alternative treatments. A comprehensive protocol, developed by a Croatian team and possibly adaptable to

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IUPHAR-SAC ACCP Workshop

(continued)

India, groups PIMs into drugs with unfavorable benefit/risk ratio, drugs with questionable efficacy, drugs to be avoided with certain conditions and potentially serious drug-drug interactions with suggested alternative therapy may offer a clinical decision support to practicing physicians.

Dr. Tobias Dreischulte (University of Dundee, UK, photograph at left) reminded us that preventable drug related hospital admissions cause approximately 4% of emergency admissions. The DQIP cluster randomised trial (Scotland) evaluated an intervention that supported general practices to review patients at risk of GI bleeding, heart failure or acute kidney failure from high-risk prescribing of non-steroidal anti-inflammatory drugs and antiplatelets. The trial demonstrated significant reductions in targeted high-risk prescribing as well as significant reductions in related hospital admissions. Further work is underway to extend such intervention to other aspects of high-risk prescribing in older people.

Dr. Krishna Undela (Jagadguru Sri Shivarathreeswara University, India, photograph at right) talked about adverse medication related events in the elderly with an additional layer of issues in developing countries such as India. He emphasized that the older patient population is poorly represented in clinical trials, with up to 35% of published trials excluding older people. Polypharmacy has been reported to increase the risks for inappropriate prescribing, ADEs, and morbidity and mortality in elderly population. This is also a result of complex interplay of socioeconomic and political reasons.

The panel discussion on “Are we doing enough for the elderly? Regulatory challenges and solutions” followed the individual presentations. The panelists recommended various strategies to improve healthcare delivery to the elderly, among these: healthcare policy makers should be mindful to focus on healthcare for elderly throughout the world, including ‘young countries’ like India and China. They pointed out that deficiencies in regulations need

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IUPHAR - SAC ACCP Workshop

(continued)

The panel discussion on "Are we doing enough for the elderly? Regulatory challenges and solutions" featured (L → R) Professor Nilima Kshirsagar (India), Dr. Dhvani Mehta (Vidhi Centre for Legal Policy, India), Professor Milou-Daniel Drici (France), Dr. John van den Anker (American College of Clinical Pharmacology, USA), Dr. Rohini Fernandopulle (General Sir John Kotelawala Defence University, Sri Lanka), Dr. Mini Khetrapal (Muncipal Corporation Greater Mumbai, India), Dr. Shravanti Bhowmik (Sun Pharma Advanced Research Company Ltd., India), Dr. Avinash Supe (KEM Hospital, India) and Dr. V.G. Somani (Central Drugs Standard Control Organization, India).

to be addressed, and specifically since economic, environmental conditions and needs of the elderly in developing counties are different from those in the developed world.

No specific regulation currently exists about packaging or package inserts of drugs, specifically dealing with the needs of older individuals and this should be improved (ease of medication use, packaging, and suitability of multi-compartment pill boxes, comprehensibility and font size of leaflets). What is done for children should also be instituted for the elderly in terms of products and formulations. Specific warnings and caution related to drugs commonly prescribed in older patients such as antidiabetics or antihypertensives should be prominently displayed and readily understandable. The lack of medical insurance coverage must be addressed and the government should favour the financing of the healthcare for elderly. The panelists also advocated the need for thorough medical, pharmacy and paramedical training, developed for the proper care of older patients. Last but not least, emphasis should be put on research in the elderly in developing countries, with particular focus on phytopharmaceuticals, alternative Systems of Medicines and pharmacovigilance. ●

Milou-Daniel Drici
Chair, IUPHAR Pharmacoepidemiology and Pharmacovigilance Subcommittee

Upcoming Events

July

Scientific Frontiers in Natural Product-Based Drugs Conference co-organized by the **Pharmacological Society of Singapore**
July 6 - 7, 2017 in Singapore
http://pharmacologicalsociety.sg/wp/2017/01/08/scientific-frontiers-in-natural-products-based-drugs-6-7-july-2017

August

Rhythms of Life: 38th World Congress of the **International Union of Physiological Sciences**
August 1 - 5, 2017 in Rio de Janeiro, Brazil
http://iups.org/congresses/2017-congress

8th European Workshop on Cannabinoid Research organized by the **British Pharmacological Society**
August 31 - September 2, 2017 in London, United Kingdom
https://www.bps.ac.uk/news-events/future-scientific-meetings/2017/8th-european-workshop-on-cannabinoid-research

September

Pharmacokinetics and Pharmacodynamics Workshop sponsored by the **British Pharmacological Society**
September 11 - 12, 2017 in London, United Kingdom
https://www.bps.ac.uk/news-events/future-scientific-meetings/2017/pharmacokinetics-and-pharmacodynamics-(pkpd)-works

IUPHAR Gastrointestinal Section Symposium in Africa
September 12 - 14, 2017 in Lagos, Nigeria
http://iuphar-gi-africa2017.org

Integrative & In Vivo Pharmacology Workshop sponsored by the **British Pharmacological Society**
September 18, 2017 in London, United Kingdom
Email Laura.Neville@bps.ac.uk

2017 Safety Pharmacology Society Annual Meeting
September 24 - 27, 2017 in Berlin, Germany
http://www.safetypharmacology.org/am2017

International Conference on the Mechanism of Action of Nutraceuticals / IUPHAR Pharmacology of Natural Products Section Joint Conference
September 27 - 29, 2017 in Aberdeen, United Kingdom
http://www.icman-iuphar-np-2017.org

Continued on page 31...

Upcoming Events

September (continued)

23rd Scientific Symposium of the **Austrian Pharmacological Society**
September 28 - 29, 2017 in Innsbruck, Austria
http://www.aphar.at/2017

October

Advances in Pharmacological Sciences: Annual Conference of the **South African Society for Basic and Clinical Pharmacology**
October 2 - 4, 2017 in Bloemfontein, South Africa
http://www.sapharmacol.co.za

Systems Pharmacology: 49th Congress of the **Brazilian Society of Pharmacology and Experimental Therapeutics**
October 17 - 20, 2017 in Ribeirão Preto, Brazil
http://www.sbfte.org.br/br/sbfte-2017-ocorrera-em-ribeirao-preto-sp

Experimental Medicine Training Day supported by the **British Pharmacological Society**
October 20, 2017 in London, United Kingdom
https://www.bps.ac.uk/news-events/future-scientific-meetings/2017/experimental-medicine-training-day

Drugs, Health and Quality of Life: 38th National Congress of the **Italian Society of Pharmacology**
October 25 - 28, 2017 in Rimini, Italy
http://www.sifweb.org/eventi/eventi_sif.php

December

Optimising medicines for optimal patient outcomes co-organized by the **Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists**
December 5 - 8, 2017 in Brisbane, Australia
http://www.asceptasm.com

Pharmacology 2017: Annual Meeting of the **British Pharmacological Society**
December 11 - 13, 2017 in London
https://www.bps.ac.uk/pharmacology2017

To include your IUPHAR member society events here, please e-mail the details to iuphar@kumc.edu .

Pharmacology International

June 2017

BRITISH PHARMACOLOGICAL SOCIETY

TODAY'S SCIENCE TOMORROW'S MEDICINES

Register & submit your research

8TH EUROPEAN WORKSHOP ON CANNABINOID RESEARCH

31 August 2017 – 2 September 2017
University of Roehampton, London, UK

Dates for your diary

Abstract submission deadline: **13 June**

Member bursary deadline: **13 June**

Early bird discounted registration closes: **31 July**

Registration closes: **24 August**

The field of cannabinoid research has been one of the most vibrant and active areas of pharmaoclogy and biomedical sciences in recent years.

We look forward to welcoming senior academics, researchers, clinicians, postdoctoral researchers and early career investigators, postgraduate students as well as pharmaceutical industry representatives, policy makers, government agencies and members of the media.

Please visit **www.bps.ac.uk/ewcr2017** or contact **meetings@bps.ac.uk**

Register & submit your research from July

PHARMACOLOGY 2017

11 – 13 December 2017
London, UK

Dates for your diary

Registration opens: **early July**

Member bursary deadline: **8 September**

Abstract submission closes: **8 September**

The British Pharmacological Society is pleased to announce initial details for its flagship annual meeting.

The latest research from across the whole spectrum of pharmacology will be the focus for plenary lectures, symposia, oral communications, and poster sessions. As with previous years, there will also be invaluable opportunities for participants to network with over 1,000 pharmacologists from across the world – including our guests from the Japanese Pharmacological Society.

For more information about attending or presenting at *Pharmacology 2017*, please visit **www.bps.ac.uk/pharmacology2017** or contact **meetings@bps.ac.uk**

Continued on page 33...

BRITISH PHARMACOLOGICAL SOCIETY

TODAY'S SCIENCE TOMORROW'S MEDICINES

SAVE THE DATE

UPCOMING BRITISH PHARMACOLOGICAL SOCIETY MEETINGS & WORKSHOPS

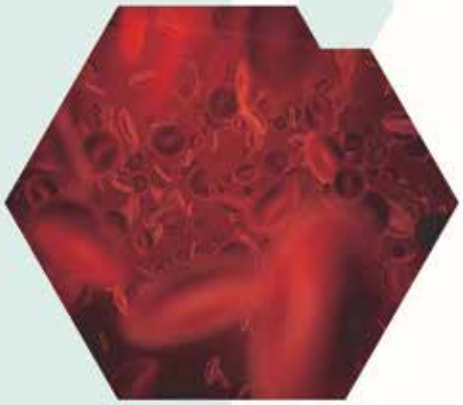
Members and non-members are welcome to book their place for these events

PKPD workshop

11 & 12 September 2017 | London, UK

- The fundamental principles of PKPD data analysis
- Other contributory factors and processes that influence measurements and outcomes
- How PKPD informs preclinical and clinical study design

For further information please contact Laura Neville, Education & Training Manager **laura.neville@bps.ac.uk**



Integrated & In Vivo Pharmacology workshop

18 September 2017 | London, UK

- Good practice in laboratory animal sciences, animal welfare and the 3Rs
- Legal and moral obligations as a Project Licence Holder or experienced Personal Licencee under the Animal (Scientific Procedures) Act, 1986

For further information please contact Laura Neville, Education & Training Manager **laura.neville@bps.ac.uk**

IUPHAR Gastrointestinal Section Symposium in Africa

Dear Colleagues and Friends, Greetings!

With pleasure, we invite you to Africa for the first IUPHAR Gastrointestinal (GI) Section Symposium in Africa. Africa hosted the World Congress of Basic and Clinical Pharmacology for the first time in 2014, at which point the IUPHAR GI Section decided to organize a symposium in Africa in 2017. So, we are hosting this global IUPHAR GI symposium to stimulate scientific activity in our region. The symposium is supported by Lagos State University College of Medicine (LASUCOM), the West African Society for Pharmacology (WASP/SOAP), Pharmacology for Africa (PharfA), and Strategic Insights Solutions Ltd (UK).

The aim of the Symposium in Lagos September 12th - 14th, 2017 is to discuss current gastrointestinal disorders and diseases worldwide, current treatments, research and drug actions, new targets and strategies against gastrointestinal mucosal injury, and new drug developments. Scientists, clinicians, academics, industrialists, government employees, nurses, pharmacists, and medical practitioners from all over the world will be in attendance. Students and young scientists will be supported in their interests to develop gastrointestinal research.

The symposium will include the keynote address "Food-gut-brain mechanisms in the regulation of hunger and satiety for health" by Prof. Duan Chen, Chair of the IUPHAR Gastrointestinal Section. There will be nine plenary sessions delivered by global experts, plus expert foci, scientific oral and poster sessions, electronic/virtual presentations, drug presentations by industrialists, research collaboration sessions, and exhibitions. Certificates of Participation and CME Credits will be awarded. The symposium will be followed by a book of proceedings. Early registration is available at http://iuphar-gi-africa2017.org/registration through July 31st, 2017.

Call for Abstracts

Abstracts of up to 400 words are invited via http://iuphar-gi-africa2017.org/wp-content/uploads/2017/05/MAY-4-IUPHAR-SYMPOSIUM-ABSTRACT-SUBMISSION-FORM.pdf through July 15th, 2017 in the following areas:

1. Biomarkers of gastrointestinal diseases
2. Biomodulators of gastrointestinal conditions
3. Diet and the gastrointestinal tract
4. Digestive problems and their therapeutics
5. Drug absorption disorders
6. Drug actions against gastrointestinal microbes and parasites
7. Drug targets in the gastrointestinal tract
8. Epidemiology of gastrointestinal diseases and effective therapy
9. Gastroesophageal reflux disease and its pharmacological treatment
10. Gastrointestinal cancers and their pharmacological treatment
11. Herbal medicines
12. Hot topics and burning issues
13. Inflammatory bowel disease and its pharmacological treatment
14. Mucosal injury and pharmacological protection
15. New actions of old drugs
16. Obesity and its new methodology in pharmacological treatment
17. Peptic ulcer and its pharmacological treatment
18. Properties and actions of new drugs
19. Stress and the gastrointestinal tract
20. Other

Industrial participants and exhibitors are encouraged to email exhibition@iuphar-gi-africa2017.org to learn how you can share your products and presenations with the registrants.

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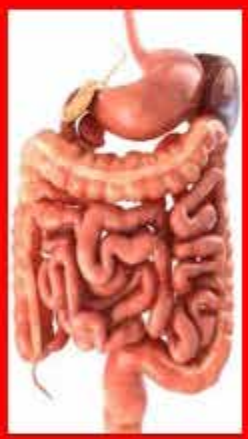
GI Gastrointestinal Section
IUPHAR
International Union of Basic and Clinical Pharmacology

The 1st IUPHAR-Gastrointestinal Section Symposium in Africa, Lagos, September 12-14th 2017

"The state-of-the-arts in gastrointestinal research and medicine: pathogenesis, pharmacologic prevention, and treatment"

COME TO AFRICA

Discussing Gastrointestinal State-of-the-Arts: research, science, drugs and medications, A GLOBAL BE THERE for scientists, clinicians, academics, industrialists, government, nurses, pharmacists, and medical practitioners.



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registration@iuphar-gi-africa2017.org

Pharmacology International

June 2017

Scientific Topics Include:

- Gender Differences in Cardiovascular Diseases
- Oncology Drug Safety Testing in the 21st Century
- Preclinical Suicidality
- Translational Safety Pharmacology
- New Modalities and New Biological Entities
- The Pathophysiology and Treatment of Tinnitus
- Disease Models and Personalized Medicine
- *In Vitro* Microphysiological Systems to Predict Safety
- *In Silico* Modeling—From Bench to Bedside
- Animal Models and Species Selection
- CiPA Challenges and Opportunities

Abstract Submission Deadline: June 15, 2017

Register by July 15 and Save $200!

www.safetypharmacology.org

ICMAN

IUPHAR

Joint Conference between the
International Conference on the Mechanism of Action of Nutraceutical (ICMAN)
&
International Union of Pharmacology (IUPHAR) Natural Products Section

27 - 29 SEPTEMBER 2017, AECC, ABERDEEN, SCOTLAND



"From Nutraceutical to Pharmaceuticals - Common Challenges and Approaches"



SUPPORTED BY:

ROBERT GORDON UNIVERSITY ABERDEEN

UNIVERSITY OF ABERDEEN

AECC
ABERDEEN EXHIBITION & CONFERENCE CENTRE

MAIN CONFERENCE THEMES:

- Novel Sources of Nutraceuticals and Natural Product Pharmaceuticals
- Novel pathways, mechanisms of action and function
- Pharmaceutical/Nutraceutical Interactions
- Bioavailability of nutraceuticals and Natural Product pharmaceuticals
- East meets West - the convergence between nutraceuticals, TCM & western medicine
- Personalised nutrition and medicine

LUNCHTIME WORKSHOP TOPICS:

- Novel tools for nutraceutical/NP pharmaceutical research
- Regulation and Health Claims
- Nutraceuticals and TCM's in practice
- Developing a database of nutraceuticals and NP-pharmaceuticals
- Social Responsibility and Sustainability of exploiting natural resources
- Biotechnology and upscaling of production

KEEP AN EYE ON:

Natural Product Biotechnology 2017
will precede ICMAN

NATURAL PRODUCT BIOTECHNOLOGY

NEW DEADLINE ANNOUNCED

31 July 2017 for Abstracts for Posters ONLY

Posters will be displayed throughout the duration of the conference.

http://www.icman-iuphar-np-2017.org

Pharmacology International

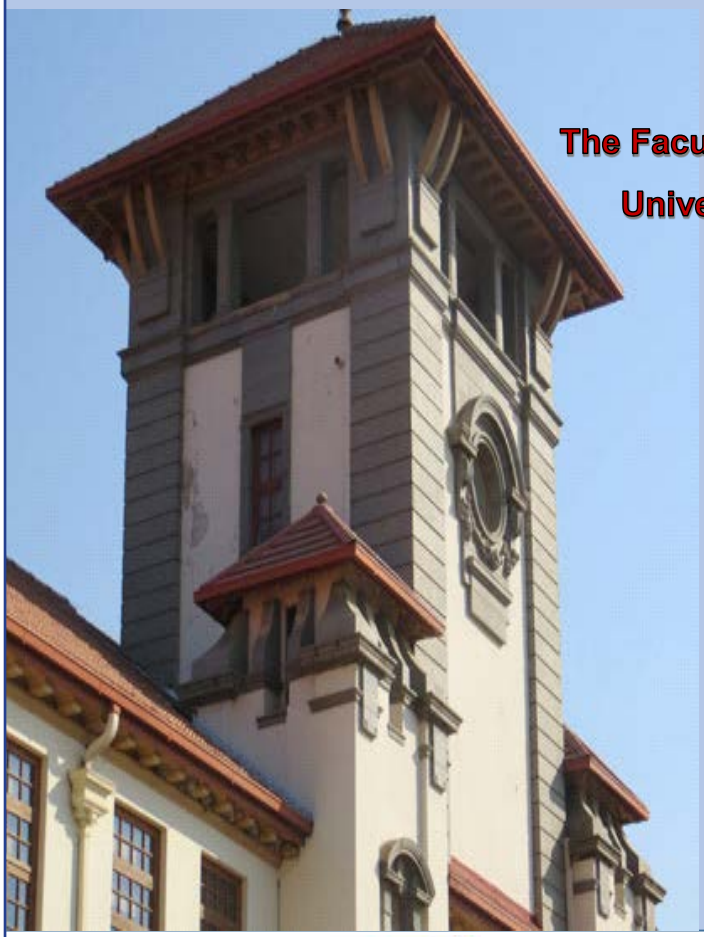
June 2017

October 1 - 4, 2017

The South African Annual Pharmacology Conference (SAPHARM-2017)

SAPHARM-2017
01-04 October

Advances in Pharmacological Sciences



The Faculty of Health Sciences
University of the Free State
Bloemfontein
South Africa

Website: www.sapharm-2017.org

CALL FOR ABSTRACTS
Accepting abstracts now

CALL FOR ABSTRACTS

Authors are invited to submit abstracts for oral and poster presentations. Visit http://www.sapharm-2017.org for instructions.

Deadline for abstract submission for bursary consideration = 30 June 2017
Deadline for all abstract submissions = 31 August 2017

Pharmacology International

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