

Alliance between the International Union of Basic and Clinical Pharmacology and the Indian Pharmacological Society for Health, Education, Drug Discovery, and Development in India

Background

The International Union of Basic and Clinical Pharmacology (IUPHAR) Secretary General participated in the high-profile meeting hosted at the impressive Drug Discovery Centre, built up by Anakit Shah, during December meeting of the Indian Pharmacological Society (IPS) in Rajkot, Gujarat. The new Prime Minister, Shri Narendra Modi, and his cabinet colleague, Shri Jagat Prakash Nadda, Union Minister of Health and Family Welfare, is proposing a revolution for science, education, health, and technology (and patents) as a continuation of the heritage. IUPHAR and IPS, which is member society of Indian National Science Academy, will make a strategic alliance for scientific education to give, if funded, videoconference/rapid web access to each Indian University/College/Research Institute and thus, access to IUPHAR online education programs and conferences. The Rajkot Conference demonstrated that the future can be a great success for the young people that organized it.

India faces major challenges in health care, science, and education, but new technologies and education offer novel solutions if the necessary funding can be identified for implementation. Van Noorden^[1] listed the key statistics for interdisciplinary research in Indian science. In summary, India lags behind in patents, a key driver for young biotechnology companies, but this is now being addressed by new legislation. Figure 1 from Nature shows how the number of scientists is related to Research and Department spending. While, at first glance, this might be viewed as negative, it can also be seen as a major opportunity because education is directly related to a nation's wealth. Therefore, if web-based learning increases the number of engineers and/or doctors to 1–2000/million, it would make an immense difference to India's scientific ranking and hence economic wealth. This article proposes new ways forward for pharmacology and health care.

Pharmacology is the Science of Drugs and Therapy

The IUPHAR is proving itself as a good arbiter of research questions – what we know and do not know – in the multiple

areas of drug targets and therapy with an excellent synergy between industry and academia, without conflicts of interest, as only validated data are used. The publically available IUPHAR databases are backed up by >90 subcommittees (700 expert scientists) and >100 publications (h-index 76) so accessed by >160 countries.

IUPHAR bridges preclinical and clinical research to help advance health care in developing countries. As an example of preclinical strategies, in Africa, we helped initiate PharFA, a constellation of African pharmacological societies, which encourages African pharmacologists to access the world's scientific journals via HINARI and participate in mentoring schemes. IUPHAR promotes pharmacological training in developing countries via Integrative and Organ Systems Pharmacology (IOSP) training courses, chaired by David Lewis (<http://www.etris.leeds.ac.uk>), which have benefitted over 200 early and mid-career African pharmacologists. A key issue for training is linking animal data with clinical data and understanding regulatory guidelines (e.g., which animal species to use in toxicology, reducing animal use, the use of good clinical practice in clinical trials, and the requirement for ethical committees in preclinical and clinical studies). Such training will improve confidence in Indian clinical trials.

The IUPHAR Clinical Division, chaired by Darrell Abernethy, has a major set of initiatives to promote clinical pharmacology throughout the world. Chaired by Lars Gustafsson, Sweden, and Dinesh Badyal, India, the IUPHAR Subcommittee for Clinical Pharmacology in developing countries presented the key concepts of the clinical pharmacology strategic document jointly published by the IUPHAR, World Health Organization (WHO), and Council for International Organizations of Medical Sciences (CIOMS) in 2012.^[2] The WHO and the CIOMS endorse our clinical pharmacology practice documents.

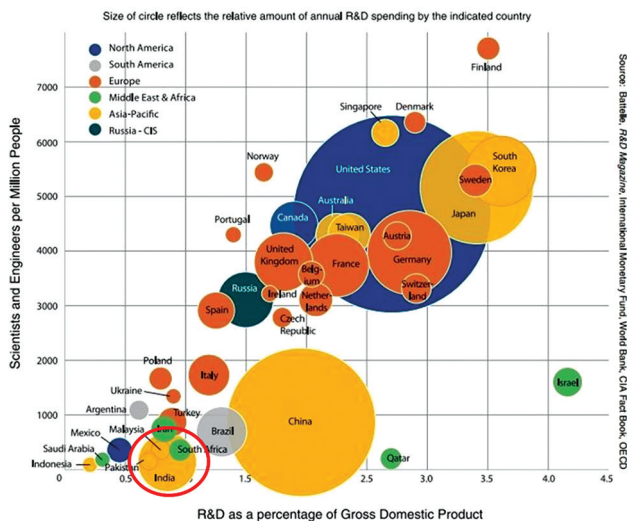
Web-learning and Information

A major grant from the Wellcome Trust to IUPHAR and British Pharmacological Society (BPS) funding allowed the development of website on the mechanism of action of all drugs called the IUPHAR/BPS Guidetopharmacology.org. This funding has now been renewed to cover all immunological targets, allowing the funding of specialized curators at the University of Edinburgh. Such projects are supported by the

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Figure 1: R and D as a percentage of a nation's wealth, source: Nature



world's pharmacology societies. IUPHAR is now developing in conjunction with the American Society of Pharmacology and Experimental Therapeutics (ASPET), the IUPHAR/ASPET Pharmacology Education Project, to deliver a worldwide drug education resource that is freely available. IPS is becoming a partner in the project. Thus, IUPHAR has a network of web facilities [<http://www.iuphar.org>; Table 1], with a unique expert-based quality control. These will be the subject of the June 2016 issue of *Pharmacology International*.

In addition, IUPHAR has been a co-organizer of many conferences and workshops [Table 2].

Drug Discovery and Development in Academia and Industry

The world is awash with scientific data, but interpretation for therapeutic benefit lags far behind. This is particularly difficult for the pharmaceutical industry because there are so many new concepts; drug discovery becomes even more challenging. IUPHAR can provide a precompetitive level playing field for collaboration between pharmaceutical industry, biotechs, and academics as shown by recent and ongoing extensions into defining what we know and do not know by expert subcommittees in antibodies, immunopharmacology, kinases, epigenetics, and allostery.

The meetings that hatch these review articles have remarkable science and are fun so encourage regular participation. For example, world-class scientists, such as William Catterall, have flown economy class from Seattle to Paris biannually for years to work over a weekend, ensuring the classification of voltage-gated ion channels. We produced the kinase database with relevant pharmacology in the website in a year. There are a total of 90 expert subcommittees (700 scientists), coordinated by 5 curators and the newly-appointed NC-IUPHAR, Chair Steve Alexander. The websites demonstrating the output of IUPHAR are listed in Table 1.

These initiatives are now fully integrated into the collaboration with IPS, and we hope represent a major opportunity for Indian health care and education.

Table 1:

Websites for International Union of Basic and Clinical Pharmacology and their publications and statistics

- <http://www.iuphar.org> with links to all IUPHAR sections and websites
- <http://www.guidetopharmacology.org>
- <http://www.guidetopharmacology.org/nciupharPublications.jsp>
- https://scholar.google.fr/scholar?q=international+union+pharmacology&btnG=&hl=fr&as_sdt=0%2C5
- [http://www.ncbi.nlm.nih.gov/pubmed/?term=IUPHAR\[Title\]%20AND%20Review\[Title\]&cmd=DetailsSearch](http://www.ncbi.nlm.nih.gov/pubmed/?term=IUPHAR[Title]%20AND%20Review[Title]&cmd=DetailsSearch)
- <http://www.etris.leeds.ac.uk>

Table 2:

Specific worldwide education projects. In 2014-16, International Union of Basic and Clinical Pharmacology has organized

- World congress for basic and clinical pharmacology in cape town in 2014, with multiple education aspects, links with toxicology, animal training, clinical pharmacology, and cutting edge research
- IOSP courses (use of animals training, ethics, etc.) in Africa from 2008 through 2014, China in 2016, and potentially India in 2017
- Clinical Pharmacovigilance (side effects of drugs) in Cairo during March 2016
- Pharmacogenetics in Cape Town during April, 2016
- IUPHAR World Conference on the Pharmacology of Natural and Traditional Medicine in Singapore during 2015 (potentially Paris, 2016; Scotland, 2017)
- IUPHAR executive committee meetings in Xi'an, China
- Drug discovery and development meeting with pharma representatives in China
- Six NC-IUPHAR meetings in Edinburgh or Paris (worldwide experts in drug targets)
- Two gastrointestinal pharmacology meetings during 2014 and 2016
- Two immunopharmacology meetings during 2014 and 2016
- A symposium will be presented at ASCEPT in Melbourne during November 2016

ASCEPT=Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists, IUPHAR=International Union of Basic and Clinical Pharmacology, NC-IUPHAR=Nomenclature and drug Classification International Union of Basic and Clinical Pharmacology, IOSP=Integrative and Organ Systems Pharmacology

What should we do? India and the world, with 7 billion people, are at a crucial turning point, so educating a vast resource of young people via the web is a crucial opportunity to benefit future generations.

1. Distance education: If suitable funding can be obtained by IUPHAR and IPS, the proven and innovative capacity to resolve pharmacological problems and further education can be used to improve basic training and education of scientists via web-based learning. We will apply for grants to enhance web access and to establish specialized videoconference facilities in Indian universities and colleges to participate in conferences in the developed world to through live and podcast transmissions to India to make available to scientists in the developing world the latest science
2. Natural products: More than 50% of the world's population does not have access to evidence-based medicine. Sixty

Figure 2: National Facility for Drug Discovery at Rajkot



percent of the world's population uses only natural products even though the scientific proof of effectiveness is rarely clear from clinical trials. Yet, natural products are a rich potential source of therapeutic drugs and have been the starting points of some of the world's most effective medicines. We propose to start a major initiative on natural products, via the Pharmacology of Natural Products Section to attempt to answer this question. In this respect, natural products are frequently claimed to have major anti-inflammatory/immunological effects, which is part of the motivation for the IUPHAR major initiative, supported by the Wellcome Trust, to identify all the potential immunologic targets in pharmacology, starting with kinases

3. Local education: We will set up the IOSP training courses in India. IPS and IUPHAR will collaborate on the Pharmacology Education Project to enhance the resources available through the website
4. Experimentation: Simple, validated protocols will be made available for experimental design using relatively inexpensive equipment to standardize experimentation

and to progress Indian science as quickly as possible to the cutting edge of pharmacology. The IPS has already started to build-up protocols and run training courses

5. Participation: Indian scientists are invited to play an even more important role in IUPHAR activities. Dr. Bhagirath Patel, who is both IPS Secretary General and serves on the IUPHAR Executive Committee, will help shepherd the ongoing collaborations between the organizations.

How can you become involved?

1. Consult the websites and social media (e.g., in gidetopharmacology), propose solutions
2. Participate actively in IPS meetings, build-up banks of protocols, and contribute to the education project, extending pharmacology into all health science-related disciplines.

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