Please join us for an innovative symposium

Open Source Drug Discovery

The symposium is sponsored by the ACS Division of Business Development & Management (BMGT). The symposium is financially sponsored by Eli Lilly and Company and cosponsored by the Division of Medicinal Chemistry (MEDI) and the Theme: Chemistry for Preventing & Combating Disease (CPCD).

Monday, August 23rd, 2010

Session I 9:00 – 12:00 pm
Session II 1:00 – 5:00 pm
BCEC, Room 254A/B, Boston, MA

Please join the BMGT division and Organizers Richard Harper and Bernard Munos as we host speakers and colleagues from three continents on this cutting edge topic.
Open Source Drug Discovery  
Monday, August 23rd, 2010, 9:00 am – 5:00 pm

8:30 am  
Introductory Remarks  
Richard Harper and Bernard Munos

8:35 am  
“Open Innovation: A Novel Approach to Collaborative Research for Global Good”  
Dr. Samir Brahmachari

9:05 am  
“The New Ecology of Collaborative Pharmaceutical Research”  
Dr. Christopher Austin, M.D.

9:35 am  
“Producing Drug Innovation on a Shoestring: Innovation Networks for Neglected Diseases”  
Dr. Solomon Nwaka

10:05 am  
Intermission

10:20 am  
“GSK's approach to open source malaria drug discovery”  
Dr. F Javier Gamo

10:50 am  
“Innovating in Drug Innovation: What’s Next?”  
Dr. Alpheus Bingham

11:20 am  
Panel Discussion

12:00 pm  
Adjourn Morning Session

1:30 pm  
Introductory Remarks  
Richard Harper and Bernard Munos

1:35 pm  
“The Compelling Economics of Open Innovation for Drug R&D”  
Mr. Bernard Munos
2:05 pm
“OSDD: Making Open Innovation Work”
Dr. Zakir Thomas

2:35 pm
“Lilly's Phenotypic Drug Discovery Initiative Work”
Dr. Marta Pineiro-Nunez

3:05 pm
“Distributed Drug Discovery (D3): Linking Basic Research and Education to Find Drug Leads for Neglected Diseases”
Dr. William Scott

3:35 pm
“Collaborative Drug Discovery: A Platform for Transforming Neglected Disease R&D and Beyond”
Dr. Sean Ekins

4:05 pm
Panel Discussion

5:05 pm
Reception and book signing for The Chemical Industry and Globalization
Abstracts:

1 – “Open Innovation: A Novel Approach to Collaborative Research for Global Good”

From ancient times India had been a champion of open innovation. India has now adopted the TRIPS regime and CSIR is spearheading the patenting of new products and processes. Admittedly, a market-oriented research incentive does not work for diseases that lack market. Therefore we should ask: Can Open Source Drug Discovery address global healthcare challenges in infectious diseases? When it comes to providing drugs for tropical diseases, what needs be addressed is affordability. Neglected diseases, such as tuberculosis, malaria or leishmaniasis, affect the poor. If drugs must be made affordable to the poor, exclusivity in the marketplace alone should not be the key guiding principle.

Can we combine the strengths of chemists in synthesising new molecules, the insights of the biologists, the skills of informaticians on one collaborative platform to reduce the costs of discovery, and at the same time provide micro-attribution to the contributions of each and everyone? Can we use the existing business models of contract research on an open public-private partnership mode with regular feedback to the scientific community to reduce the cost of development process including clinical trials? The Open Source Drug Discovery model (www.osdd.net) provides an alternative model of innovation for drug discovery.

CSIR-led Team India Consortium with global partnership has pioneered this approach for the development of affordable drugs through Systems Biology approach for tuberculosis. The details of this will be presented.


Over the last decade, remarkable changes have occurred in the science, processes, and economics of drug development, bringing about a realignment in the traditional roles of the public and private sectors in drug development. At NIH, the Molecular Libraries, Therapeutics for Rare and Neglected Diseases, and Rapid Access to Intervention Development programs, among others, have brought technologies and expertise into the public sector that were previously only present in biopharmaceutical companies. A firmly precompetitive space for early phase (target to lead) small molecule research has been established, fostering the development of chemical biology, chemical genomics, and cheminformatics research that are defining gene, protein, and pathway functions in unprecedented detail, and continually expanding and redefining druggable genome space.

With the Human Genome Project and related initiatives identifying the genetic causes of an unprecedented number of rare diseases, the continuing scourge of tropical diseases, and the retrenchment of the biopharma industry leading to decreased drug development activity on even more common diseases, NIH and other public agencies have recognized the opportunity and the imperative to develop innovative and collaborative later stage (preclinical and POC human) drug development programs, particularly for rare and neglected diseases. The successes, lessons, and ongoing challenges of this historic realignment in drug discovery will be discussed, through the lens of the NIH programs working in this area.
3 – “Producing drug innovation on a shoestring: innovation networks for neglected diseases”

For the last 10 years, WHO/TDR has been in the vanguard of pharmaceutical innovation as it fostered the creation of public-private partnerships to pioneer novel approaches for research in neglected diseases. These organizations now boast attractive pipelines of projects, and several have brought drugs all the way through clinical development and into the market. More importantly, they have demonstrated the capability to discover and develop drugs for a fraction of the costs typically incurred by pharmaceutical companies. Armed with this experience, WHO/TDR has just launched an even more ambitious project, which is to unite the disparate biomedical research infrastructure across Africa into a continent-wide network that can discover and develop novel drugs for the diseases of Africa. This presentation will review the challenges encountered in implementing public-private partnerships, and will discuss their relevance to areas other than neglected diseases.

4 – “GSK's approach to open source malaria drug discovery”

In its aim to work in partnership and encourage research in neglected tropical diseases, GlaxoSmithKline has released structures and data on more than 13,500 antimalarial inhibitors found in its screening compound library.

GSK has tested the 2 million compounds present in the corporate library used routinely for HTS in a whole-cell screening approach using the 3D7 *P. falciparum* strain. The screen has yielded 13,533 compounds inhibiting parasite growth more than 80%. This set has been named TCAMS (Tres Cantos Antimalarial Set).

Additional experiments, like activity against *P. falciparum* resistant strains or activity against the hepatoma HepG2 cell line as surrogate of cytotoxicity, have been performed to add knowledge to the TCAMS. Also, using the proprietary information existing in our databases, a prediction of the putative antimalarial target has been made for those compounds with available data.

In order to encourage further research by the larger malaria community on the cellular targets and mode of action of the compounds, we have made public the chemical structures of the compounds in TCAMS, together with the above mentioned data.

All the information is publicly available at the URL: [http://www.ebi.ac.uk/chemblntd](http://www.ebi.ac.uk/chemblntd) and ideally, this could be a world-wide chemical genomics approach to better understand the druggable genome of *P. falciparum*. It is the first time to our knowledge that a pharmaceutical company has made public the structures of so many proprietary compounds in the hope that it could lead to the development of new and innovative treatments for malaria.

5 – “Innovating in drug innovation: what’s next?”

Since the 1990s, Dr. Bingham has pioneered many of the innovations that are helping redesign drug R&D. InnoCentive and Chorus, which he founded while leading the eLilly division of Eli Lilly, are two of his lasting contributions. Now retired and full-time
innovation thinker, scholar, and entrepreneur, he is actively involved in creating another generation of tools that will take drug innovation to the next frontier. His presentation is a peek on things to come.

6 – “The compelling economics of open innovation for drug R&D”

We are in the midst of a scientific renaissance that is yielding unprecedented insights into pathology, but these discoveries are not translating very well into new therapies. The cost of developing new drugs, which is estimated to be billions of dollars apiece, is limiting the number of projects that can be funded. Those that proceed through development and registration face increasing resistance from payers when they reach the market. These costs pressures have been even harsher in areas that offer limited commercial prospects such as rare diseases, biodefense, and the diseases of poverty. Yet, the challenge of producing treatments for these neglected areas has encouraged scientists and entrepreneurs to come up with alternative R&D models that are often based on the networked architecture that is characteristic of open innovation. We now have a growing body of data to compare the economics of traditional and open innovation models. This presentation reviews the figures that make open innovation a compelling option. It also discusses the profound transformation that awaits organizations wishing to embrace it, and its implications for the pharmaceutical industry.

7 – “OSDD: Making Open Innovation Work”

The Open-Source Drug Discovery (OSDD) is global scientific community of more than 3000 persons from 74 countries that was launched in September 2008 by India’s Council for Scientific and Industrial Research (CSIR). OSDD facilitates collaboration among biologists, chemists, bio- and chemo-infomaticians, mathematicians, software professionals, management professionals and others. www.osdd.net is a web 3.0 portal which facilitates that collaboration. It has several ongoing projects such as identifying drug targets and inhibitors. It has already yielded an early hit that is being taken forward. OSDD also has set up a small molecule library for screening against Mtb, In December 2009, OSDD announced an open-source ‘Connect-to-Decode’ project to reannotate the entire Mtb genome. About 800 researchers signed up to collaborate. The task was divided into five themes that covered gene ontology, protein-structure, interactome/pathways, glycomics and the immunome annotation. In a span of less than four months, these highly motivated contributors completed the task under the guidance of experienced scientists. This talk will explain the basic concepts of OSDD and take you through the process followed in this highly challenging open collaboration model.

8 – “Lilly’s phenotypic drug discovery Initiative Work”

The Lilly Phenotypic Drug Discovery (PD2) Initiative is a novel open innovation program that seeks to engage researchers worldwide in the identification of novel compounds that have potential to be developed into drug candidates for key areas of disease focus. Since its launch in June of 2009, PD2 has been well received by scientists and technology transfer professionals alike. To date, more than 140 institutions around the globe have become affiliated with the program and numerous compounds have been evaluated in the
phenotypic disease modules. My presentation will describe the scientific rationale behind PD2, the business model and operational details. Additionally, metrics collected to date that describe the performance of the program will be shared.

9 – “Distributed Drug Discovery (D3): Linking Basic Research and Education to Find Drug Leads for Neglected Diseases”

This seminar will discuss the concept of Distributed Drug Discovery (D3) and how it adapts basic research to enable, on a global scale, the simple, reproducible and inexpensive synthesis of many potential drug-lead molecules for neglected diseases. D3 has created and published open-source virtual catalogs containing biomimetic molecules accessible by simple and reproducible synthesis in academic laboratories across the world. We have demonstrated this synthetic capability in Indianapolis (USA), Moscow (Russia), Barcelona (Spain) and Lublin (Poland). Collaborators can access these virtual catalogs. When computational analysis identifies promising molecules from them, they can then be readily made by undergraduate students in a distributed fashion. This open-source, integrated process of Distributed Drug Discovery facilitates a direct link between education and drug lead discovery for neglected diseases.

10 – “Collaborative Drug Discovery: A platform for transforming neglected disease R&D and beyond”

Collaborative drug discovery (CDD) is a new approach to biomedical research that uses a web-based software to host and share multiple kinds of databases. The community currently using CDD includes leading researchers working on neglected diseases such as malaria and tuberculosis. It uses CDD as a repository for public and private data on *Mycobacterium tuberculosis*, and to enable data-mining and collaborations by the scientific community. For instance, after capturing well over 300,000 molecules and related data from patents, literature and high throughput screens (making it the largest publicly available Mtb database), our team has used the CDD tools and functionalities to gain novel insights into the molecular properties of compounds active against this pathogen. Pharmaceutical R&D could leverage this approach, and use CDD software and researcher networks to tackle other neglected as well as mainstream diseases.