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Bringing together the academic drug discovery community

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Abstract

The newly formed Academic Drug Discovery Consortium (ADDC) aims to support the growing numbers of university centres engaged in drug discovery that have emerged in response to recent changes in the drug discovery ecosystem.

At the end of 2011, the Johns Hopkins Brain Science Institute in Baltimore, Maryland, USA, invited stake-holders from academia and industry to attend a conference there to discuss the changing ecosystem of drug discovery. Attendees included prominent researchers from academic drug discovery centres in the United States, representatives from major pharmaceutical companies and opinion leaders in translational research from the US National Institutes of Health (NIH). The numerous challenges and opportunities discussed at the conference, together with the rapid emergence of new academic drug discovery centres, prompted leaders from Johns Hopkins University, Vanderbilt University, the University of North Carolina, Harvard University and Brigham and Women's Hospital, and the University of California, San Francisco to form the Academic Drug Discovery Consortium (ADDC).

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FURTHER INFORMATION ADDC: <http://www.addconsortium.org>

The NCATS Budget: <http://www.ncats.nih.gov/about/budget/budget.html>

ALL LINKS ARE ACTIVE IN THE ONLINE PDF

All authors are founders and board members of the ADDC.

Within 1 year of its founding, the concept of bridging this growing community was so well received that 83 academic drug discovery centres and programmes joined from the United States, as well as other countries. Here, we highlight the changes catalysing this growth, and the goals and components of the ADDC.

Changes in the drug discovery ecosystem

Over the past decade, the pharmaceutical industry has experienced major business challenges, including an estimated cost of US\$1–2 billion to develop a new drug, development timelines of 15–20 years and a failure rate that approximates 95 percent^{1–3}. Given these grim statistics, many pharmaceutical companies have been forced to downsize their operations, especially in early drug discovery.

This has been particularly common in therapeutic areas with the highest risks of failure, such as central nervous system disorders. For example, AstraZeneca shut down its entire internal neuroscience drug discovery research in 2012, and in its place created a ‘Virtual’ Neuroscience Innovative Medicines Unit tasked with identifying and developing external drug discovery opportunities with shared cost, risk and reward. This illustrates the industry’s recent movement towards a more open innovation model, partnering with small biotechnology companies and academic institutions to develop programmes focused on novel drug targets.

Partly in response to these challenges, the NIH has expanded its interest and funding of translational research. Two years ago, the NIH Director Francis Collins initiated the National Center for Accelerating Translational Science (NCATS). As a reflection of this new focus, while the overall NIH budget is flat or even decreasing this fiscal year, the NCATS budget increased by over 11% (see Further information). Most NIH institutes have also initiated funding mechanisms focused on drug discovery for the major therapeutic areas they support.

The new external focus of industry, coupled with the enhanced support of translational activity by the NIH, has resulted in a rise in the number and sophistication of academic drug discovery centres. Twelve years ago there were approximately a dozen centres in the United States; today there are closer to 100 centres. These centres are utilizing basic biomedical discoveries made in their universities to identify, validate and advance novel drug targets towards the clinic. Many of these new centres are staffed with veterans from the pharmaceutical industry and have integrated capabilities in medicinal chemistry, assay development, screening and evaluation of pharmacokinetics. Now, early drug discovery work, such as target validation, assay development, high-throughput screening and lead identification is being shifted from companies to academic drug discovery centres. Pharmaceutical companies can then license later stage, de-risked programmes that could have a higher chance of success, and move them through clinical development and ultimately to market.

Indeed, an increasing number of academic–industry alliances and licensing deals have been announced in recent years. For example, Janssen partnered with Vanderbilt University to develop novel therapeutics for schizophrenia arising from the university’s drug discovery

efforts. Eisai and Johns Hopkins University announced a partnership through which Eisai will screen its proprietary drug library against the university's novel targets and provide hits back to the university's drug discovery centre to develop into clinical candidates. Disease foundations, such as the Michael J. Fox Foundation and the Cystic Fibrosis Foundation, are also actively supporting drug discovery in academia. Although most of these collaborative partnerships are at a preclinical stage, a sphingosine-1-phosphate 1 receptor modulator known as RPC1063, which was optimized from an NIH-supported screening effort at the Scripps Research Institute, was licensed by Receptos and is in Phase II/III trials in patients with relapsing multiple sclerosis and in patients with ulcerative colitis.

Goals and components of the ADDC

The ADDC was formed to nurture academic drug discovery centres in this rapidly changing environment. For example, as the academic drug discovery model is so new, many centres do not know what their peers are doing. So, a key goal of the ADDC is to build a collaborative network to facilitate the exchange of expertise and technology know-how, and the formation of partnerships between each other and industry.

In its inaugural year, in addition to the 83 academic drug discovery centres and programmes that have joined, more than 500 individuals in 22 countries have also registered from more than 300 organizations, which include universities, pharmaceutical companies, government institutions and disease foundations. Moreover, multiple companies have approached the ADDC asking for assistance in matching their interest in specific targets and/or diseases to ADDC members with relevant expertise or offering ADDC members access to their chemical libraries for high-throughput screening, with the potential option of licensing leads obtained. The top three areas of therapeutic focus of the ADDC centres are oncology (73%), neurological disorders (63%) and infectious disease (65%). Among these centres, 54% are selectively pursuing small-molecule drug discovery, 43% are involved in both small- and large-molecule research and 3% are exclusively focused on biologics. The number of employees per centre ranges from 2 to over 100; the median size is 15 employees.

A key component of the ADDC is its interactive [website](#) (see Further information), which enables scientists to share information about their centres and programmes, as well as exchange technical expertise on drug discovery and development strategies. The website serves as a repository for drug discovery events, educational material, job postings and partnership opportunities with the pharmaceutical industry. There are dozens of drug discovery lectures, videos and podcasts available, as well as current listings of upcoming drug discovery seminars and conferences. All of this content has been created and uploaded by its members. There is also a searchable database of drug discovery jobs, and a catalogue of contract research organizations that provide specific drug discovery services, such as toxicology, medicinal chemistry or pharmacokinetics analysis that drug discovery centres may prefer, or need, to out-source. Through the active participation of ADDC members this website will become a valuable tool for every scientist working in the drug discovery arena. Additionally, member involvement will permit the ADDC to effectively advocate in one voice to the NIH and other agencies about drug discovery funding decisions.

Following the success of the initial conference in Baltimore, the ADDC will hold annual meetings, which began this year with a meeting in Nashville from 9–11 October, hosted by the Vanderbilt Center for Neuroscience Drug Discovery and attended by nearly 600 academic and industry scientists, entrepreneurs and venture capitalists. In addition to keynote addresses and platform talks by drug discovery thought leaders, the conference included over 200 partnership meetings between academic and industry scientists to discuss specific opportunities for collaborations.

Future ADDC initiatives include improving the website listing of drug discovery service providers by allowing members to openly comment on and rate providers. Additionally, the ADDC is initiating a webinar series for its members on various aspects of drug discovery, development, regulatory science and intellectual property. Starting in 2014, the ADDC also plans to host smaller meetings on pressing topics of relevance to the academic drug discovery community. One such topic under consideration is the lack of reproducibility of landmark translational research⁴, as ADDC centres could play a major role in reproducing and validating initial findings by advancing novel hypotheses through the drug discovery process. Another is the inherent disconnect between the traditional promotion model in universities, which is focused on independent research, and the collaborative approach and entrepreneurship that are required for successful drug discovery.

There will be challenges for the ADDC, not the least of which is sustaining engagement with the centres, members and with the pharmaceutical industry. It is only through the active participation and open sharing of its growing membership that the ADDC will successfully advance its mission of strengthening the academic drug discovery community, and ultimately improve the translational science in academia that leads to new therapies.

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