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SYMPOSIUM

Helping Science and Drug Development to Succeed through Pharma-Academia Partnerships

Yale Healthcare Conference 2013

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The theme of the 2013 Yale Healthcare Conference was "Partnerships in Healthcare: Cultivating Collaborative Solutions." The April conference brought together leaders across several sectors of health care, including academic research, pharmaceuticals, information technology, policy, and life sciences investing. In particular, the breakout session titled "Taking R&D Back to School: The Rise of Pharma-Academia Alliances" centered on the partnerships between academic institutions and pharmaceutical companies. Attendees of the session included members of the pharmaceutical industry, academic researchers, and physicians, as well as graduate and professional students. The discussion was led by Dr. Thomas Lynch of Yale University. Several topics emerged from the discussion, including resources for scientific discovery and the management of competing interests in collaborations between academia and the pharmaceutical industry.

Recent years have marked an increased need for collaborations between pharmaceutical companies and academic investigators. The pharmaceutical industry, as a whole, has been afflicted with declining research and development (R&D†) productivity, loss of shareholder value, and reduced profit potential [1]. Pharmaceutical companies are failing to keep up with historical trends of productivity in drug development. The costs of bringing a new molecular entity (NME) to market have risen steadily over the past decade, reaching an estimated $1.8 billion per NME in

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†Abbreviations: R&D, research and development; NME, new molecular entity; NIH, National Institutes of Health; NSF, National Science Foundation; CDC, Centers for Disease Control and Prevention.

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2010. Moreover, an increasing number of generics are being prescribed in the United States, and key drug patents are set to expire. It is estimated that from 2010 to 2014, patent expirations will put over $209 billion in annual drug sales at risk [2].

Pharmaceutical companies are not the only ones under pressure. Academic investigators face declining research budgets. National Institutes of Health (NIH) funding is at an all-time low. Less than 20 percent of NIH grant applications are successful in obtaining funding [3,4]. To make matters worse, in 2013, United States budget sequestration is projected to cause an additional reduction of $1.7 billion in NIH grant funding and a loss of 700 competitive research grants [5,6].

In such troubled times, pharmaceutical companies and academic institutions are teaming up to tackle the challenges of drug development and research. Often with multi-million dollar contracts, these collaborations ideally benefit both parties. Pharmaceutical companies can have earlier access to novel scientific discoveries, while academia can receive additional research funding in times of dwindling grant support. Such collaborations are becoming more commonplace. Some examples include GlaxoSmithKline with the Immune Disease Institute in Boston, AstraZeneca with Columbia University Medical Center, and Pfizer with the University of California, San Francisco [7].

At the 2013 Yale Healthcare Conference in April, Dr. Thomas Lynch led the discussion on partnerships between the pharmaceutical industry and academia. In his academic research career, Lynch has pioneered applications of EGFR mutation as a predictive marker for lung cancer treatments. He now serves as Physician-in-Chief at the Smilow Cancer Hospital at Yale-New Haven, acts as a consultant to several major pharmaceutical companies, and serves on the Board of Directors of Infinity Pharmaceuticals. Other participants of the discussion included members of pharmaceutical companies (Johnson & Johnson, Roche, Boehringer Ingelheim), academic researchers (Yale, Cornell), practicing physicians, and professional and graduate students.

RESOURCES FOR SCIENTIFIC DISCOVERY

Much of the conference session centered upon the distribution and utilization of resources in partnerships between pharmaceutical companies and academic institutions. Funding was cited as a major resource of concern. Federal research funding has declined in recent years, and since 2011, NIH grant success rates have dipped below 20 percent. With the Budget Control Act of 2011, federal biomedical research spending is expected to suffer an additional decrease ("sequestration") in 2013. It is estimated that this will lead to a reduction of up to $2.5 billion in the NIH budget, $0.6 billion in the NSF budget, and $0.5 billion in the CDC budget [6]. In such times of dwindling grant support, money from pharmaceutical contracts can help assuage some of the funding woes facing academic investigators.

Many academic institutions have established multi-million dollar research partnerships with large pharmaceutical companies, and Yale, Lynch and the conference's home institution, is no exception. In 2011, Gilead Sciences and Yale School of Medicine announced a $10 million-per-year partnership. Gilead will provide $40 million in research and infrastructure support during the initial 4 years of the contract with the possibility, at the end of the initial 4-year period, to extend the partnership to $100 million over 10 years. In exchange, Gilead will have access to novel compounds or technologies identified by research projects funded through this partnership. Research projects will be selected by a joint steering committee composed of three representatives from Gilead and three representatives from Yale [8]. Participants at the conference discussed ways of determining which projects are supported. In some collaborations, separate projects are chosen by the pharmaceutical company and academic investigators, while in others, projects are jointly decided by vote from a committee representing both parties. The Yale-Gilead partnership follows the latter approach, and Lynch, who serves as a member of the steering committee, described the partnership as a collaborative effort in bio-

medical research and lead generation. The tie-breaking vote on the steering committee goes to a Yale representative, Dr. Joseph Schlessinger, given the committee's confidence in his experience and insight on lead development.

Aside from funding, the discussion also touched upon access to compounds and human talent as resource advantages of pharma-academia collaborations. Pharmaceutical companies can provide their patented compounds for academic researchers to test. Not only can researchers test the efficacy of the compounds, but they can also utilize the compounds to spark new areas of investigation, such as elucidating the mechanisms of disease processes. However, there are also potential pitfalls. Academic investigators are often left "hand-tied" when pharmaceutical companies limit the direction of research involving company-provided compounds. When this happens, researchers become locked in a narrow window of study and lose the freedom to engage in the creative discovery that is an underlying hallmark of academic investigation. Academic investigation is not intended to replace pharmaceutical R&D. If there are directed experiments that companies would like to complete with their compounds, it would be advisable to do so through the companies' R&D departments. When working with academia, pharmaceutical companies should expect to give academic researchers freedom in research, which often leads to novel discoveries.

There is also a division of talent between the pharmaceutical companies and academia. Traditionally, the pharmaceutical industry has focused on the realm of drug development and bringing novel therapies to the public, while academia has been the leader in basic science discovery [9]. "Talent in drug development is in pharma," Lynch stated during the discussion, "but academia often has the best scientists for lead generation." With collaboration, drug development can be faster and more efficient as academic researchers can focus on developing scientific leads and proposing novel ideas. Pharmaceutical researchers can then choose those leads that look most promising for further development.

OVERCOMING COMPETING INCENTIVES

While partnerships between academia and pharmaceutical companies confer benefits to both parties, competing interests can potentially impede collaboration. Academia and the pharmaceutical industry tend to focus on different incentives. In pharma-academia partnerships, academia's desire to publish often needs to be balanced against a desire by pharmaceutical companies to gain exclusive access to new technology. The management of intellectual property can also be a potential obstacle. Academic investigators often attach high value to novel technologies that result from their research, but from the industry perspective, academics often have unrealistic expectations of the worth of their intellectual property [10]. Pharmaceutical companies tend to consider the high rate of attrition in drug development and are reluctant to assign excessive financial value to an early-stage scientific discovery.

Participants at the conference discussed strategies for balancing such competing interests. For academic investigators, the timely publication of scientific studies is a high priority, and the freedom to publish must be carefully managed in any successful pharma-academia collaboration. In a survey by GlaxoSmithKline, half of the academic collaborators identified "restrictions imposed on publications" as a major concern of working with industry [10]. Pharmaceutical companies are encouraged to refrain from unduly influencing the timing and content of academic publications. The Yale-Gilead collaboration was cited as an example in the management of competing interests. In this collaboration, Gilead requests a certain period of time after a discovery during which a study cannot be submitted for publication. However, after the allotted time, academic researchers are free to publish their data. Gilead also can potentially develop any intellectual property generated.

Furthermore, it was noted during the conference, academics and pharmaceutical companies should recognize that while that their reward systems may differ, both share a common goal of improving health through biomedical research [11]. As much as possible, collaborations should focus on the alignment of incentives and interests. Both sides should be ready to give concessions to establish a common ground.

CONCLUSION

Among the health care partnerships showcased during the 2013 Yale Healthcare Conference, pharma-academia partnerships were recognized as a growing and important model for facilitating the development of new treatments. During this time of dwindling federal research funding, collaborations between academia and pharmaceutical companies can provide a key source of financial support for academic investigators. Academia is often best at scientific discovery and lead generation, while pharmaceutical companies are more effective at translating discoveries into therapeutic use. Such domains of expertise complement one another and, when brought together in a successful working relationship, can accelerate the efficiency of drug development. Through panels that combine both academic and pharmaceutical representation, such as the Yale-Gilead steering committee, mutual interest can be gauged. Rather than having separate projects for the pharmaceutical companies and separate projects for academic purposes, it seems that interests are better aligned when the projects are mutually agreed upon.

The pharmaceutical industry and academia often follow different incentive systems. The careful management of these incentives is crucial in establishing successful collaborations between academia and the pharmaceutical industry. Pharmaceutical companies are hesitant to allow the immediate publication of new discoveries because of the chance of losing their advantage in drug development. However, for academic researchers, publications are a crucial way to show their work and discovery. Thus to satisfy both interests, there must be concessions from both sides: a promise of future publication but also time for pharma R&D to work on drug development. An agreement of a strict period of time after a discovery during which there can be no publications could be made beforehand to avoid uncertainty.

By pursuing projects of mutual interest and by making concessions based on a better understanding of each other's incentives, pharmaceutical companies and academic institutions can engage in stable collaborations leading to more scientific discovery, faster drug development, and better health care treatments.

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