



Opportunities Abound For Innovation

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“To succeed, jump as quickly at opportunities as you do at conclusions”

-Benjamin Franklin



The opportunities to embrace innovation within healthcare systems and academic medical centers have never been greater, given the current precipice of technology, including the fields of artificial intelligence (AI), genomics, genetics, and machine learning—to name a few. While equipped with these technologies, we as caregivers have never had more scrutiny with regard to value-based care and demonstrating true benefit for the individual and society. We are all part

of the race to make these contemporary tools work for us, as no one technology or solution is the end goal because they must always remain the means to improved care.

Transition of Academic Medical Centers

The Bayh-Dole Act of 1980, which gave universities the legal right to take title of inventions that resulted from federal research grants, caused institutions to revamp their technology transfer capabilities^{1,2}. During the last three decades, most research universities established a technology transfer office (TTO) to help license new discoveries, resulting in \$2.5 billion in licensing revenue for universities in 2015². Over the past 25 years, more than 84,000 U.S. patents were issued to research institutions, with 6680 of these patents issued in 2015 alone³.

More recently, within research universities and healthcare systems, these TTOs have embraced innovation models, which seek to provide support for researchers, scientists, students and faculty to make them aware of how TTOs can support their needs. In addition, innovation centers and Chief Innovation Officers provide connectivity between researchers and possible industry collaborators, as well as other opportunities to help generate technology co-creation. Chief Innovation Officers within healthcare systems often have a slightly different charge, as they are tasked with driving efficiencies within a large integrated delivery network (IDN) through value-based models. Examples include developing AI-Bot and machine learning technologies that allow for patient engagement and empowerment around adherence to medications and reduction of readmission rates. Further areas of impact around patient-based behavior economics are key areas for investigation and research. Ideally, these entities collaboratively support the mission of the academic research, as well as improve the lives of our patients.

Goals of Innovation

Research universities have integral strengths in many areas but lead in discovery and invention, which complement the innovation process. The ability to rapidly introduce new discoveries and

technological advances has the potential to make dramatic changes to the healthcare landscape. The goals of healthcare innovation revolve around three key tenants: improving efficiencies, accessibility, and affordability through key advances in individualized care. Innovation aiding in therapy optimization and outcomes over time are crucial. New medical device development should be aimed away from iterative change and toward transformative value-based idea generation.

The National Science Foundation (NSF) seeks to provide “foundational” support of research for transformative advances within fields of science or engineering. Their criteria for these transformative research grants are reviewed based on two merit review criteria: Intellectual Merit and Broader Impacts³. The NSF recognizes that those working on this frontier take “high risks in their research”³. Government agencies, like the NSF, help researchers clarify the end-goals and value of their projects, which are increasingly aligned with industry in seeking high risk/high reward impact.

Successful Partnerships Require Shift from Outcomes to Impact

Having had the fortunate opportunity to span a career that includes clinical care, medical device industry and now a firsthand commitment at a premier academic university, I recognize that the prospects and opportunities for innovation have never been more robust or more needed. Outside the research and science that are generated at an academic center, translational opportunities are also clearly outlined. To realize those translational efforts, collaborative relationships with industry partners across sectors are oftentimes needed. However, in order to be successful with industry partners, researchers need to refocus from *outcome* to *impact*⁴, as also recognized by the NSF. The main observation that drives discussion is that industry-university collaborations often produce interesting outcomes (i.e., an insightful scientific publication, a new process or pathway, or an innovative computer code) but those outcomes have minor or no impact to society⁴.

In fact, to identify best practices, Massachusetts Institute of Technology surveyed 106 projects at 25 multinational companies that engage in research collaborations with a broad base of universities. While approximately 50% of the examined projects resulted in what were seen as major outcomes (i.e., produced new ideas or solutions to problems, developed new methods of analysis or generated new intellectual property of potential benefit for the company), only about 20% of the projects led to major impacts⁴. Thus, we must work to align the outcomes with the impact of the researcher and the collaborator, as well as the academic mission.

Over time, these relationships allow for new technology development to be accelerated and brought to the bedside. Furthermore, developing and aiding cross-functional collaborations are integral to attaining the intended impact. The University of Pennsylvania has committed large resources to a new center for medical devices (Penn Health-Tech) which does just this in bringing together science, research and the clinical community together with engineers.

Innovations at the UPENN

While innovation opportunities at academic institutions globally have grown, the University of Pennsylvania is truly unique in its support of researchers and inventors. As an example, Reuters recently ranked UPenn fourth among for the World's Most Innovative Universities. The Penn Center for Innovation (PCI) has distributed more than \$100 million of licensing income and sponsored research funding at Penn. PCI has filed 869 patents, and been issued 111 U.S. patents. In addition, it has executed on 654 commercial agreements.

With all the opportunities available, it is the individual researcher or scientist's choice to seek them out. Therefore, I want to leave you with a challenge from one of the university's founders, Benjamin Franklin: "The height of foolishness is to discard an opportunity

without full investigation." The onus is on you—the researchers—to take advantage of all that the university has to offer.

References

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