

Accelerating the Development of a Universal Influenza Vaccine

Issues to Consider for the Options X Dialogue

The Urgent Need for a Universal Influenza Vaccine

Influenza poses a looming threat unlike almost any other natural disaster. Not only does influenza have a significant annual toll, but without warning, an entirely new strain of the virus may emerge to threaten an immunologically unprotected human population and challenge our ability to design effective vaccines before they are needed.

Influenza presents a significant threat to public health and the global economy; and a 'moonshot' Universal Influenza Vaccine (UIV) that is highly efficacious and safe across populations, protective against all strains, and multi-seasonal would be game-changing. A renewed positive momentum towards the development of a UIV is emerging with recent commitments from key players, inclusive of the US NIH/NIAID UIV strategic planⁱ and funding, the EU Horizon 2020 investmentsⁱⁱ, the Flu Funders Consortiumⁱⁱⁱ, and the Bill & Melinda Gates Foundation and Flu Lab UIV Grand Global Challenge^{iv}.

Propelled by these opportunities along with reminders of the epic toll of the 1918 pandemic, the Sabin-Aspen Vaccine Science & Policy Group (the Group) probed the current state of UIV discovery and translational science, the structures and organization of R&D related to vaccines, and how funding and financing underwrite existing vaccines and promote or stymie the development of new vaccines.

The Challenges

In its [report](#), the Group evaluated critical challenges across the UIV ecosystem that impede progress. These include scientific challenges in upstream innovation, a lack of incentives and resources for translational work to proceed, as well as downstream and post-market issues that are likely to emerge as the scientific opportunities evolve. Although there are many groups pursuing different aspects of influenza research and vaccine development, there are critical gaps in scientific understanding and research, as well as limited application of existing knowledge, that restrict progress. The persistence of coordination problems in “hand-offs” among academia, industry, and government—particularly concerns associated with the uncertainty of market disruption and regulatory challenges in the face of existing vaccines—discourage more rapid breakthroughs from emerging.

In making its recommendations for the path forward, the Group identified the following areas as critical barriers to overcome:

- A lack of sufficient and necessary scientific understanding to advance discovery (well defined in the recent strategies of both the US NIH and the EU Horizon 2020 strategies)
- An ecosystem that lacks sufficient opportunities for novel approaches to drive both discovery and development (as an example, we have seen far less in the way of discoveries associated with immuno-oncology, platform technologies, or AI applied to influenza than what we've seen in the field of HIV/AIDS)
- The absence of identified leadership focused on the UIV goal and coordinating capabilities to promote continuous learning across the global academic-industry-government ecosystem to accelerate and scale transformative efforts
- A lack of sufficient catalytic funding that both enables and supports higher-risk, higher-reward opportunities that lack early data or testing to secure more traditional funding
- A lack of urgency that defies both the real and ever-present of influenza as well as the transformational opportunity that a UIV would present in taking this threat off the table

The Big Ideas

To address these challenges the Group moved forward to offer three 'Big Ideas' to inspire and focus a call to action that seeks to reinforce and extend ongoing work and catalyze bold new pathways to discovery. These recommendations require strategic convergence across the influenza vaccine ecosystem to accelerate and achieve influenza vaccine breakthroughs.

- **Move swiftly to create a single-mission entity focused on accelerating the development of universal influenza vaccine to achieve global protection.**

With the recognition that government, industry, or philanthropy alone are unlikely to achieve the desired impact at the accelerated pace required, a new, independent entity should be established to maintain dedicated focus on UIV, in partnership with multiple sectors and key stakeholders. The new entity should include and leverage existing investments (from public, philanthropic, and industry sources) and build on a full understanding of ongoing work and resources so as to augment and complement endeavors already underway, not replace or compete with them.

- **Develop and implement a universal influenza vaccine innovation agenda.**

There must be a comprehensive scientific understanding of the challenge, from understanding the biology of the virus and our immune response to it, through development, licensure, policy development, and introduction and delivery of the vaccine. Critical to achieving success will be a directed agenda to bring new science and technology to generate creative problem-solving and to meet this challenge. Innovative research using emerging tools and technologies, together with a strategic approach toward development

of a UIV, could lead to a real breakthrough that has to date eluded past efforts. The convergence of new and rapidly progressing advances in the life sciences, manufacturing platform technologies and computational sciences applied to everything from protein structure to predictive algorithms of vaccine efficacy make the current moment a more promising time than ever to marshal resources toward the goal of dramatically reducing the threat of influenza.

- **Design a new communications strategy to drive a movement for a universal influenza vaccine.**

Complacency undermines the opportunity to eliminate the looming threat of influenza. Shifting the paradigm of how the public, health professionals, and policymakers talk and think about influenza requires a re-framing of the issue to convey the pressing need for defenses against influenza — including use of UIV. This strategy should provide momentum and demand for a solution.

Mobilizing Next Steps

The Sabin-Aspen Vaccine Science & Policy Group are in unison in urging the creation of a single entity — mobilizing the efforts of government, philanthropy, and industry — whose sole purpose is to develop and produce a UIV. The Group understands this Big Idea to be intentionally disruptive, yet potentially transformative. The Group appreciates the need for incremental steps in achieving this overall goal and strives to build upon and complement critical existing efforts.

Flu Lab and Sabin are seeking to activate efforts that are embedded within the existing ecosystem of committed players and responsive to the report's ideas and recommendations. In its 'call to the action', the report identifies six core functions that are considered central to overcoming the barriers that currently impede accelerated progress to making a UIV a reality. Collectively or individually, these core functions are considered the backbone of efforts that would seek to broadly coordinate and drive progress in the UIV ecosystem and advance all three of 'The Big Ideas' put forward by the Group.

Engaging Ecosystem Partners to Consider the Core Functions of a Single-Mission Entity

A mission-focused, coordinating entity accelerating UIV development would be expected to contribute critical inputs to the existing ecosystem of committed players and activities to achieve catalytic impact. Engaging and mobilizing these stakeholders will move 'Big Ideas' into action. Building from the work initiated by the Sabin-Aspen Group, Flu Lab and Sabin have committed to further interrogate and align the proposed priorities and approaches among a wide cross-section of the influenza ecosystem. To date, over 75+ leaders from academic research, public and private research funding organizations, the biotech and pharmaceutical industries, and public policy institutions have been engaged. To continue this work and draw on the individual expertise and

organizational experience and perspectives of each participant, we expect the Options X Dialogue to consider how we might best structure and operationalize around the identified six core functions—including how we leverage and scale current efforts from among this group to align with these goals.

To prime the discussions in Singapore, please consider the following questions and issues associated with the six core functions identified to close gaps across the ecosystem and accelerate UIV development:

Enabling collaboration: Inter- and intra-disciplinary collaboration among scientists and vaccinologists, experts who are traditional and non-traditional to UIV, researchers and product developers, and UIV policy and programmatic stakeholders.

- What kinds of inter- and/or intra disciplinary collaborations do you think are important to accelerate UIV development? What sectors are represented in these collaborations: academia, industry, government, philanthropy?
- What are the barriers to building collaborations that would include partners from other institutions, other sectors, and/or other disciplines in the broad areas of science and technology not currently working on UIV? How have you managed to overcome them in your collaborations?

Product-focused support: Enable progression of candidates or platforms to create a UIV, with the end goal of achieving global access and broad program implementation.

- With a potential market as large as that estimated for a UIV, is complementary capital from government and/or other private sector/philanthropic sources required to de-risk programs that will promote and bring viable candidates to scale?
- If so, what are the specific 'pain points' where such capital can be most catalytic in giving oxygen to more candidates and platforms?

Data- and asset-sharing: Provide shared resources, both as incentives for collaboration and to decrease barriers to entry for any single player or new players.

- With the expectation that broader and early research data-sharing (methods and protocols, successful and failed experiments, and null and novel findings, data sets) can speed the pace of discovery, enable rapid reuse and leveraging of key insights, and reduce duplication:
 - What activities are you currently engaged with that target one or more of these objectives?
 - What are the key barriers to effective data-sharing and what existing or novel approaches could be supported to overcome these barriers?
- Material asset-sharing of assays, reference standards, and immunological samples can enhance and broaden the application of these tools for discovery and development:
 - What existing programs or activities could be expanded to target and accelerate UIV development?
 - How could new, catalytic funding be best targeted to create greater access and availability of critical material assets across the UIV ecosystem (among academia-government-industry)?

Ecosystem visibility: Promote continuous learning. Track activity throughout the UIV ecosystem to surface potential opportunities and accelerate progress; provide lateral and external visibility.

- How important is shared visibility across the ecosystem to accelerated progress?
- Is it important for any one institution or coalition to track activity throughout the ecosystem?

Catalytic funding: Allocate funding as an incentive for novel collaboration and research, to enable data and asset-sharing, and to drive product-focused support; ensure that funding is flexible, rapidly deployed, and appropriately targeted to drive catalytic impact.

- What kind of game-changing and innovative approaches have you considered that connect with the vision of the report's recommendations? Are there funding opportunities currently available for such work?
- What kind of challenges have you faced in pursuing work you deemed promising, but 'too novel' to be considered by current funders?

Championing the cause: Rally support for the “moonshot” end goal both within the UIV ecosystem and to the broader public; provide thought leadership to surpass incrementalism; ensure sustained commitment, public demand, and readiness for a UIV

- How important is alignment on a common UIV goal to accelerating progress?
 - Does the ecosystem need a convener and/or leader of a coalesced effort?
 - What about shared visibility across the ecosystem?

ⁱ A Universal Influenza Vaccine: The Strategic Plan for the National Institute of Allergy and Infectious Diseases, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6279170/>

ⁱⁱ Public Health–Driven Research and Innovation for Next-Generation Influenza Vaccines, European Union, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6346458/>

ⁱⁱⁱ Global Funders Consortium For Universal Influenza Vaccine Development, <https://unifluvac.org/>

^{iv} Ending the Pandemic Threat: A Grand Challenge for Universal Influenza Vaccine Development, <https://gcgh.grandchallenges.org/challenge/ending-pandemic-threat-grand-challenge-universal-influenza-vaccine-development>