HEALTH

With new grants, Gates Foundation takes an early step toward a universal flu vaccine

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Bill Gates addresses guests during the World Health Summit in Berlin in 2018. JOHN MACDOUGALL/AFP/GETTY IMAGES

Scientific teams from inside and outside the world of influenza research have been awarded funding to try to unlock mysteries that could provide the foundation for a future universal flu vaccine, the Bill and Melinda Gates Foundation and the philanthropy Flu Lab have announced.

The funds, up to $12 million, will be awarded to as many as eight teams of researchers, the Gates Foundation and Flu Lab announced Thursday (local time) at Options for the Control of Influenza, the flu world's largest scientific conference, currently underway in Singapore. The maximum grant will be $2 million and the funding will stretch over two years. The announcement comes a full year later than the Gates Foundation initially intended, with some significant changes from what BMGF co-founder Bill Gates laid out when he announced the funding opportunity — one of the foundation's Grand Challenges — in late April 2018.

Applicants were to submit their proposals within two months and successful grantees would be notified by August 2018, the original call for proposals stipulated. The work was supposed to be advanced enough that successful teams would be able to start testing their vaccine in people by 2021 — an ambitious timeline, to say the least.

That the grants are only being awarded in August 2019 reflects a reality that became apparent when the proposals were being evaluated. The field of influenza vaccinology simply isn't that close to being able to design a flu vaccine that would protect broadly against the strains of flu that infect people every winter and those in nature that could emerge to trigger a disruptive and deadly pandemic.

"It became quite clear, looking at what we received, that this was too optimistic," said Keith Klugman, director of the pneumonia program at the Gates Foundation. "And so that was the reason for a shift to a more basic science approach."

"There is literally nothing at the moment close enough that we saw that we thought we could pursue," he said.

The foundation and Flu Lab recognized that on the issue of universal flu vaccines, there were two camps. One is pursuing incremental ways to make flu vaccines more broadly protective, but does not aim for what is often referred to as the holy grail of influenza — a vaccine that could protect against all flu viruses.

Though the groups behind this type of approach often appropriate the term universal flu vaccine, this work is less ambitious. Several of these broader vaccine candidates are in development.

The other camp is looking at how to design a flu vaccine that could protect against the multitude of strains that exist in nature, one which would not need to be frequently updated as the flu viruses mutated. Klugman said the Gates Foundation decided to position itself in that camp — hence these grants, some of which are for more foundational work.

They found an eager partner in Flu Lab, which stepped in to replace Google co-founder Larry Page and his wife, Lucy, who were originally going to split the cost of the work with the Gates Foundation.

"For us … this grand challenge was a search for bold and new universal vaccine concepts from diverse disciplines," said Casey Wright, Flu Lab's CEO. "That's what we want to do at Flu Lab is to fuel bold approaches to find those breakthroughs that we don't expect."

The 7 finalized awards go to:

Alice McHardy, the Helmholtz Centre for Infection Research, who will design variants of the influenza surface protein neuraminidase that have improved stability. It is thought that inclusion of more neuraminidase in flu vaccine would promote a more robust and broadly neutralizing antibody response.

Jonah Sacha, the Vaccine and Gene Therapy Institute, Oregon Health and Science University, who proposes to use a Trojan horse virus approach, inserting conserved influenza virus sequences into a stealth vector virus to stimulate a T cell immune response in the lungs.

Jonathan Heeney, the Laboratory of Viral Zoonotics, University of Cambridge, who will use a novel DNA vaccine approach for influenza.

Yoshihiro Kawaoka, the University of Tokyo, who will use a cocktail of synthetic proteins designed to focus the immune system's response to vaccine on parts of flu viruses that are common to all flu viruses.

Gwo-Yu Chuang, the Vaccine Research Center, NIH, who will apply lessons from HIV research to identify sites of vulnerability suitable to the development of a universal influenza vaccine.

Patrick Wilson, Antibody Biology Lab, University of Chicago, who will mine a library of human antibodies to influenza to design a new protein sequence for a novel, potent vaccine that should provoke a broader antibody response.

Martin Karplus, Harvard University, will use integrated methodology that combines machine learning, all-atom modelling of influenza antigen and antibody structures and simulations of the adaptive immune response to design synthetic antigens to elicit broad spectrum neutralising antibodies against influenza strains.

https://www.statnews.com/2019/08/29/gates-foundation-grants-universal-flu-vaccine/