Development of universal influenza vaccines: understanding the industry perspective

Isa Ahmad[1], Qiqi Yang[2], Chadi Saad-Roy[3], Bryan Grenfell[2,4], Prashant Yadav[5], Nimalan Arinaminpathy[1]

[1]) MRC Centre for Global Infectious Disease Analysis, Imperial College London
[2]) Department of Ecology and Evolutionary Biology, Princeton University
[3]) Lewis-Sigler Institute for Integrative Genomics, Princeton University
[4]) Princeton School of Public and International Affairs, Princeton University
[5]) Technology and Operations Management, INSEAD

The successful development of future, 'universal' influenza vaccines will require active collaboration between academia, the pharmaceutical industry and public health agencies. As well as modelling target product profiles for future vaccines (see abstract AOXI0237), we sought to understand the industry perspective on the development of universal influenza vaccines: specifically, the barriers and drivers that shape commercial decisions on whether to invest in clinical development of promising new vaccine candidates.

We engaged with a range of experts, from the pharmaceutical and life sciences industry as well as from public agencies. Experts were invited to address questions in a semi-structured interview, for example: 'How would pharmaceutical industry respond to promising new candidates for a broadly protective influenza vaccine?' In addition, we performed a literature search for preclinical studies of vaccines, published between 1996 and 2021. We then mapped how many of these candidates were taken forward to clinical trials, as published in clinicaltrials.gov and trialsearch.who.int.

Despite its drawbacks, current, egg-based vaccine production has important commercial benefits for manufacturers who already heavily invested in this technology. However, it is likely that any future, broadly-protective vaccine would rely on newer, more flexible technologies such as mRNA or viral vectored vaccines. Thus, in order to justify the switch from current egg-based production, it is likely that the performance threshold that a future vaccine candidate needs to meet, to attract investment from major pharmaceutical companies, will be high. Progress towards meeting this threshold is most likely to be driven by academia, biotechnology companies, or other entities not currently invested in egg-based vaccine manufacture. In this context, our literature search found that only 24 published studies (25%) were present in published clinical trial protocols, illustrating a high rate of attrition from discovery to clinical trials.

Our findings suggest that incremental stages in the development of a future, broadly protective influenza vaccine may be unlikely to attract substantial support from major manufacturers of current vaccines, given their existing investment in egg-based production. However, the realisation of a truly disruptive new influenza vaccine may not be possible without the adoption and further improvement of such 'intermediate' vaccine products. Therefore, an important role for donors and public health agencies could be to examine whether appropriately designed push or pull support mechanisms will allow such 'intermediate' products to be sustained.