



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Editorial

Vaccines, masks, distancing and credibility: An urgent warning for pandemic management



One year into the COVID-19 pandemic and SARS-CoV-2 activity is surging. The rates of infection, hospitalization, and death are at all-time highs and continuing to rise as safe and effective vaccines have finally arrived. The majority of a weary population has welcomed these new vaccines as lights at the end of a long dark tunnel, representing the hope that we can soon reopen businesses, classrooms, and auditoriums.

Thus far, the vaccines being used in the West appear to have only rare physical side effects (e.g., anaphylaxis), but they will have dangerous behavioral side effects if they prematurely create the expectations that vaccine recipients are now safe, that the restrictions on our lives and economies can be lifted, and that preventive public health practices such as distancing, masks, testing, and contact tracing can be abandoned. Those expectations are dangerous and premature at this point for two primary reasons:

- Surging viral activity is an immediate threat to vaccine effectiveness and the achievement of herd immunity
- Vaccines will not end the pandemic without vigilant and widely used protective public health practices

Surging virus activity means that genetic variants of SARS-CoV-2 are emerging, some of which demonstrate increased fitness and transmissibility. Each of these many variants has a small but real potential to partially or even fully evade the immune response generated by vaccines. Current vaccine formulations immunize against the spike protein from a single SARS-CoV-2 strain. The immune system recognizes multiple B and T cell epitopes on the spike protein, and that multiplicity enables the immune response to be effective against variants with single/few mutations in their spike proteins. However, SARS-CoV-2 variants with numerous mutations in their spike protein have already been identified in human infections, and are spreading rapidly in the U.K., South Africa, and around the world.

The possibility that a SARS-CoV-2 variant can escape the immune response engendered by current vaccines is supported by reports that people with natural immunity following infection have become re-infected with these variant strains. The immune response following SARS-CoV-2 infection targets other viral proteins in addition to the spike protein, suggesting that the immune system's ability to protect against variants with single or few mutations in the spike protein is unlikely to be compromised. Therefore, if reinfection with a SARS-CoV-2 variant following natural infection is possible, it follows that infection with a SARS-CoV-2 variant following immunization against the spike protein alone

(generating a narrower immune response) is also possible. It is of little comfort that early reports of reinfections have been mild or asymptomatic; COVID-19 is most often mild or asymptomatic yet causes significant morbidity and mortality for many.

Social distancing and mask wearing will seem anachronistic to those who have been led to expect that the arrival of vaccines will liberate us and our economies from such practices. But science and medicine are easily misunderstood, and this view reflects a fundamental misunderstanding of viral dynamics. Those of us who are “producers” of biomedical information must anticipate such misunderstandings by those who are “consumers” of that information—particularly in an age of science skepticism. We must understand that the news media are the intermediaries between producers and consumers of biomedical information, and they only report snapshots of scientific opinion at various points in time. The media perform an invaluable service when doing this, but there are inherent risks: reporters rarely recognize new data or understand its implications, they may not fully understand or adequately explain how new data affects previously reported conclusions and, even when they do, they may not reach their original audience again to revise those conclusions.

Therefore, physicians and scientists have a duty to present the most important message to the news media when we have credibility and their attention. When they are distracted by debates about logistics and whether to distribute a limited supply of vaccine as two doses to select groups, or one dose to twice as many people (as important as those operational issues are), we must redirect them to focus on the much larger problem that is looming— that an overreliance on vaccines alone to end the pandemic is doomed to fail, and may force us to start all over with lockdowns, the design of new vaccines, new vaccine trials, frustration, disillusionment, and death on a scale that compares to a world war. It was never true that vaccines alone could do the heavy lifting against this pandemic, and it is dangerous now to allow or promote that impression. The message must be clear: ending this pandemic requires that vaccines are widely used in conjunction with non-pharmaceutical interventions of proven benefit (e.g., distancing, masks, testing, and contact tracing).

Vaccines are indeed lights at the end of this pandemic tunnel, and critical to ending the pandemic, but failing to diligently follow simple preventive public health practices risks extinguishing those lights before we reach them. Avoiding that kind of mistake will require deft political leadership, which is beyond our control. Failing to sound a loud and clear warning of that possibility would ruin the credibility of medical/scientific leadership. Avoiding that kind of mistake is well within our control.

Disclosures

Dr. Poland is the chair of a Safety Evaluation Committee for novel investigational vaccine trials being conducted by Merck Research Laboratories. Dr. Poland offers consultative advice on vaccine development to Merck & Co., Medicago, GlaxoSmithKline, Sanofi Pasteur, Emergent Biosolutions, Dynavax, Genentech, Eli Lilly and Company, Janssen Global Services LLC, Kentucky Bioprocessing, AstraZeneca, and Genevant Sciences, Inc. Dr. Poland holds patents related to vaccinia and measles peptide vaccines. Dr. Poland has received grant funding from ICW Ventures for preclinical studies on a peptide-based COVID-19 vaccine. These activities have been reviewed by the Mayo Clinic Conflict of Interest Review Board and are conducted in compliance with Mayo Clinic Conflict of Interest policies. Dr. Axelsen reports no conflicts of interest.

Paul H. Axelsen ^{a,*}
Gregory A. Poland ^{b,c,**}

^a Department of Pharmacology, Stellar-Chance Laboratories, University of Pennsylvania, 422 Curie Boulevard, Philadelphia, PA 19104, USA

^b Mayo Clinic Vaccine Research Group, Mayo Clinic, Rochester, MN, USA

^c Division of General Internal Medicine, Mayo Clinic, Rochester, MN, USA

* Co-corresponding author at: Department of Pharmacology, Stellar-Chance Laboratories, University of Pennsylvania, 422 Curie Boulevard, Philadelphia, PA 19104, USA.

** Co-corresponding author at: Mayo Vaccine Research Group, Mayo Clinic, Guggenheim 611C, 200 First Street SW, Rochester, Minnesota 55905, USA.

E-mail addresses: axe@upenn.edu (P.H. Axelsen), poland.gregory@mayo.edu (G.A. Poland)

Available online 31 January 2021