

# Can we beat influenza?

For the past 65 years, the Global Influenza Surveillance and Response System (GISRS), coordinated by the World Health Organization (WHO), has engaged in open and efficient sharing of information, viruses, and responsibilities. The GISRS's extraordinary longevity can be attributed to several generations of dedicated scientists and to the engagement of over 100 countries, often with limited resources. Currently, only two influenza A viruses and two influenza B clades are circulating and causing disease in humans, but 16 additional subtypes of influenza A viruses are circulating in nature (14 in birds and two in bats). Of the latter, six occasionally infect humans, providing an ever-looming pandemic threat. However, there is still a lack of fundamental knowledge to predict if and when a particular viral subtype will acquire pandemic ability. We therefore still fail to predict influenza pandemics, and this must change.

The GISRS's objectives are to alert the world to impending influenza epidemics or pandemics and to mitigate the global impact of influenza. The GISRS currently consists of 152 institutions, including 143 National Influenza Centers (NICs) in 113 countries. The NICs monitor the ever-changing influenza viruses and provide information and viruses to six WHO Collaborating Centers, which meet twice a year to assess risks and make recommendations about which strains should be included in seasonal flu vaccines. In the past 25 years, the recommended influenza A H3 virus—which is of primary concern for severe disease—in the flu vaccine has not matched the circulating virus on only five occasions. The GISRS also systematically updates reagents, adopts new technologies, provides training, and serves as a global resource for other emerging respiratory diseases, such as severe acute respiratory syndrome and Middle East respiratory syndrome coronavirus.

But the goals of the GISRS are not without their

challenges. Problems with sharing influenza samples climaxed in 2007 but then began to be addressed in 2011 following the adoption of the WHO's Pandemic Influenza Preparedness Framework, which places virus sharing and access to benefits on an equal footing. Fair and equitable sharing of benefits arising from the use of genetic resources under the Nagoya protocol should promote further pathogen sharing in a broader

context. With respect to the rapid sharing of influenza viruses in particular—the 65-year practice of the GISRS to develop the best possible countermeasures—the Protocol's impact is promising but will need to be thoughtfully managed.

Among the needs of the GISRS is the priority to develop better vaccines and antiviral agents to control influenza. Vaccine production has not changed much in decades; it remains a lengthy egg-based process. Furthermore, vaccine efficacy, especially in the elderly, is unsatisfactory and requires annual updates. Universal vaccines that protect against all influenza subtypes are being researched and hold

promise for future infection control. Antiviral agents used to treat influenza are limited to antineuraminidase drugs, but polymerase-targeting drugs are in development, suggesting the possibility of future multitargeted therapies.

The approaching 100-year anniversary of the 1918 Spanish influenza pandemic, considered one of the greatest public health crises in history, reminds us that influenza has the potential to cause catastrophic disease at any time. The GISRS alerts the world to these threats and to control strategies. As knowledge is gained and technology improves, so will our pandemic predictive ability and response capacity, but everything depends on rapid global sharing of both viruses and genomic information.

—Wenqing Zhang and Robert G. Webster



***“We...still fail to predict influenza pandemics, and this must change.”***



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*Science* **357** (6347), 111.  
DOI: 10.1126/science.aan7961

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