PREPARING FOR SWINE FLU

PANDEMIC: Vaccine procurement ramps up as virus gains ground

A Novartis worker inspects an H1N1-vaccine-containing syringe during the filling process.

NOVARTIS

ONE MONTH AFTER the World Health Organization called the outbreak of influenza A (H1N1) a global pandemic, the total number of confirmed cases now exceeds 98,000 in more than 120 countries, with about 440 deaths. The pandemic designation is in recognition of the virus's rapid spread and not the moderate seriousness of the disease.

"The H1N1 pandemic is unstoppable, and therefore all countries will need to have access to vaccines," said Marie-Paule Kieny, WHO director of the initiative for vaccine research, in a press briefing last week. The organization also recommended that countries immunize their health care workers first when a vaccine does become available.

In turn, countries around the world have started committing funds to buy vaccine ingredients. The U.S. Department of Health & Human Services, for example, announced last week that it would spend another $884 million on top of more than $900 million it pledged in May for bulk supplies and clinical trials (C&EN, June 1, page 6).

Under pandemic preparedness contracts set up in 2004, HHS will place orders for vaccine antigen (the active ingredient) and new oil-in-water adjuvants (to boost the immune system) from Sanofi Pasteur, Novartis, GlaxoSmithKline, CSL Biotherapies, and MedImmune.

Nearly $980 million will be paid to Novartis alone. In mid-June, the company produced its first batch of H1N1 vaccine using a wild virus strain in a new cell-culture process. At the time, Novartis also said it was close to completing the first batch using a modified virus that health agencies had provided.

Vaccine makers have found, however, that the viral strains are generating only 25–50% of normal yields, Kieny said. Although there is enough antigen for clinical testing, WHO's lab network is hunting for more productive strains. And until better data on yield and dosages are known, Kieny would not predict exactly how soon vaccine could be readied or how many billions of vaccine doses could be made.

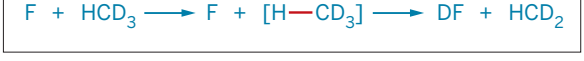
Preorder contracts between vaccine makers and countries including the U.S., the U.K., France, and Australia have raised concerns about vaccines being shared equitably with low-income nations. For its part, Kieny said, WHO is "trying to ensure equity" by getting industry donations, working with governments on doses and financing, and accelerating production.—ANN THAYER

A NEW MOLECULAR DYNAMIC FRONTIER

PHYSICAL CHEMISTRY: New experiments show bond excitation can lead to counterintuitive products

A PROVOCATIVE NEW STUDY shows that, contrary to previous experimental results, exciting a stretching mode of a bond in a molecule during a particular simple chemical reaction does not break the excited bond. In fact, the reaction rate slows, and unexpected products form. The result lays open a vast new territory waiting to be explored: one of energy distribution and transfer during molecular dynamics.

COUNTERINTUITIVE Although the C–H bond in this reaction is excited, it unexpectedly does not break. Rather, the reaction products favor DF + CHD_2.



Researcher Kopin Liu and colleagues Hiroshi Kawamata and Weiqing Zhang of Academia Sinica, in Taiwan, show that exciting the C–H stretching mode in the exothermic reaction F + CHD_3 not only leads to unexpected products DF + CHD_2 but also slows the reaction rate (*Science* **2009,** *325,* 303).

Most experiments that selectively excite the stretching mode of a particular bond in simple chemical reactions have been on endothermic reactions, and the process breaks the excited bond. For example, exciting the CD bond during the reaction CH_3D + Cl leads to the products CH_3 + DCl.

Although the precise mechanism of this new exothermic reaction has yet to be elucidated, the authors posit that exciting the C–H stretching mode enacts a host of controls on the reaction, including, perhaps, blocking energetic channels that would have ordinarily permitted the breaking of the C–H bond, transferring energy to other parts of the system, and slowing the reaction.

The new work is "beautiful," says University of Wisconsin, Madison, chemistry professor F. Fleming Crim, whose lab has been at the forefront of selective bond excitation chemistry. "These incisive experiments reveal the complexity of reactions of polyatomic molecules," Crim says. "Experiments such as Kopin's move us toward that goal and call on theory to help build models of this more complex behavior."—ELIZABETH WILSON