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Facing up to flu

The potential for mutant-flu research to improve public health any time soon has been exaggerated. Timely production of sufficient vaccine remains the biggest challenge.

Amid the scientific controversy over lab-created strains of the H5N1 avian influenza virus that can skip between mammals, it is easy to lose sight of an important public-health question: what will help the wider world to prepare for a flu pandemic? The question is crucial, because when it comes to setting priorities, the fuss over how to regulate the controversial research must not be allowed to distract from a much bigger concern. The world is ill-prepared for a severe flu pandemic of any type. In particular, it cannot yet produce enough vaccine to protect more than just a small proportion of people.

The problem was demonstrated by the 2009 pandemic of H1N1 flu. Vaccines only became available months after the outbreak began, and after the first wave had peaked in many countries. Health systems were stretched despite the relative mildness of the pandemic. The mutant-flu research does nothing to prevent a repeat of this situation.

Research to create mammalian-transmissible strains is vital basic science that could deepen our understanding of flu viruses, and of what allows a virus to jump from other species and spread easily in humans. These insights may one day produce better ways to tackle a pandemic, including ones we cannot picture today. But scientists need to be more modest and realistic with their claims about the short-term public-health benefits of such research, and provide better explanations that include the caveats.

For example, many commentators say that the biggest public-health benefit promised by the research is in the field of disease surveillance. The experiments reveal one combination of mutations that allowed the H5N1 virus to jump between species and then spread; in theory, animal-health experts can now watch out for these mutations in affected animals such as pigs and birds.

In practice, the immediate benefits are minimal. Surveillance of influenza in animals is slow and patchy at best, and follow-up sequencing of samples more so. And the mutations that we know about are likely to be outnumbered by those about which we are still ignorant.

Consider H5N1 in pigs. There is almost no systematic flu surveillance in the animals (see *Nature* **459,** 894–895; 2009). Infections are infrequent, symptoms are mild and the pig industry is concerned that talk of swine flu could unfairly taint the image of pork. As a result, the world's one billion or so pigs have yielded partial DNA sequences of just 24 H5N1 isolates, meaning that were a pandemic H5N1 virus to emerge from pigs, just as H1N1 did in 2009, there would be little or no possibility of detecting it in advance.

That does not mean that the idea of using the mutant-flu research to improve surveillance is without merit; far from it. Further work could yield a more comprehensive bank of mutations, and greater investment could create specialized centres to screen more samples in affected countries, in real time. Improving flu-virus surveillance should be a public-health priority, but international groups and governments have, in the past, been reluctant to fund it adequately. If the world is serious about preparing for a pandemic, this must change. Done properly, surveillance could one day give early warning of an approaching pandemic. What then?

At present, such advance knowledge would make little difference to the world's limited abilities to manufacture and distribute vaccines. Current techniques can produce vaccine only six months after a pandemic emerges. Doing so faster and in much larger quantities is the most urgent public-health priority when it comes to planning for the next pandemic.

"The mutant-flu studies offer no serious immediate application in vaccine research."

The mutant-flu studies contribute little to this goal. They offer no serious immediate application in vaccine research (see page 142). Any benefits to drug development — which are important, but less so than churning out vaccine for a pandemic — are more likely to flow from longer-term basic research. The mutant-flu work could certainly help this research. Yet the work itself carries a risk. An accidental, or intentional, release of the mutant viruses from a lab could spark an H5N1 pandemic that we are currently in no position to mitigate.

The fact that the risks seem to far outweigh the public-health benefits of the research, at least in the short term, means that there is no need to rush headlong into an expansion of the work. Rather, regulators and flu researchers must take whatever time they need to decide the best way for such work to proceed safely. ■

Gas and air

Natural-gas operations could leak enough methane to tarnish their clean image.

How clean is natural gas? Although it is often lumped in with coal and oil, many in the energy industry are at pains to point out that burning gas to generate electricity produces fewer greenhouse-gas emissions than does burning other fossil fuels. Certainly, countries claim reductions in carbon emissions when they switch from coal to gas, as Britain did on a large scale in the 1990s. The growing popularity of shale formations as a source of gas has re-energized the debate over its environmental impact. To release the gas, engineers must split the rock by injecting fluid under high pressure, a process called fracking. Last year, researchers from Cornell University in Ithaca, New York, said that with this taken into account, carbon emissions associated with shale gas were no better — or were worse — than those from coal.

Industry maintains that the problem has been exaggerated, and many scientists agree. Sorting fact from fiction has been difficult, however, because nobody had any independent data — until now.