Senate Homeland Security and Governmental Affairs Committee

"Risky Research: Oversight of U.S. Taxpayer Funded High-Risk Virus Research"

Safety, Security, and Independent Oversight of Research in the Life Sciences

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Chairman Peters, Ranking Member Paul, and members of the Committee, thank you for inviting me to testify concerning appropriate oversight of dual-use research in the life sciences.

Thousands of skilled individuals can now create infectious viruses using commercially available synthetic DNA that corresponds to publicly accessible viral genome sequences[1]. That includes viruses thought likely to cause pandemics.

To test our nation's ability to control access to pandemic viruses[2], my team – with FBI approval – ordered DNA encoding fragments of the 1918 influenza virus[3] from 38 DNA synthesis firms[4].

The genome sequence of this virus – which killed over 50 million people – was published by federal researchers in 2005, which provided us with blueprints. It may or may not cause a new pandemic today, but it would be unwise to take chances.

Of 38 gene synthesis providers, 36 shipped DNA, enough to make the infectious virus three times over – even though the person placing the orders used a pseudonym, had no ties to influenza research, and falsely claimed to work for an organization that doesn't perform laboratory experiments.

Everything that we did, and that the companies did, was perfectly legal. No laws regulate DNA synthesis, even though the International Gene Synthesis Consortium, the trade group representing the industry, has asked Congress to be regulated. They don't want to sell harmful DNA to anyone who isn't authorized, but there's no one to tell them which researchers and projects are legitimate.

Even though 1918 influenza is a Select Agent, anyone can legally purchase DNA sufficient to make it as long as that DNA is in pieces. Pieces that, thanks to advances in technology, can now be assembled by many high school students.

To put it mildly, this is not how we regulate fissile materials and blueprints for nuclear devices.

Unlike pathogens that have zero chance of causing a pandemic, the 1918 influenza virus is not even a Tier 1 Select Agent, nor does working with it require biosafety level 4. Our system primarily considers risks to the researcher, not risks to society.

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[1] Esvelt, "Delay, Detect, Defend: Preparing for a Future in Which Thousands Can Release New Pandemics"; Maroun et al., "Designing and Building Oncolytic Viruses"; Neumann, Ozawa, and Kawaoka, "Reverse Genetics of Influenza Viruses"; Xie et al., "Engineering SARS-CoV-2 Using a Reverse Genetic System."
[2] Esvelt, "Credible Pandemic Virus Identification Will Trigger the Immediate Proliferation of Agents as Lethal as Nuclear Devices."
[3] Tumpey et al., "Characterization of the Reconstructed 1918 Spanish Influenza Pandemic Virus."
[4] Edison R, Toner S, Esvelt KM, "Evaluating the Adequacy of DNA Synthesis Screening."

Failing to prioritize transmissibility is a major oversight, especially after Covid. It persists in part because there's no single agency or board in charge of biosafety and biosecurity. But it's mostly because the agencies that fund high-risk research currently regulate themselves. This is a bad idea.

I have tremendous respect for Dr. Parker's achievements chairing the National Science Advisory Board for Biosecurity. But at the end of the day, he reports to a department whose research he ostensibly oversees, and they can dismiss him or ignore him as they please. That is not adequate oversight.

I love science, and I don't want my lab at MIT to be regulated any more than it is. Too often, regulations harm progress. But public mistrust *also* harms science. And the way to build trust is to earn it – which doesn't happen when you insist on regulating yourself.

We are overdue for a systemic reappraisal of which pathogens, DNA, and experiments are dangerous for *safety*, and for *security* – which are not the same thing.

I urge Congress to empower an independent board to assess which labs should have access to which harmful agents and DNA sequences, to decide when the benefits of dual-use funding proposals exceed the risks, and to determine when sharing a genome sequence or experimental outcome would irreparably harm national security.

The board's decisions should be made with total transparency[5], except when national security requires otherwise. The board should include scientists, but also machine learning experts, security analysts, diplomats, and most importantly, members of the general public.

Had such an independent board existed in 2005, when researchers first decided to publish the genome sequence of the 1918 influenza virus, I would be considerably more confident that doing so was the responsible decision[6]. Had it existed in 2009, USAID would have been warned that trying to credibly identify pandemic-capable viruses posed a serious risk to national security, rather than proceeding unawares for over a decade[7]. And if such a board existed today, I'd be more confident that future decisions about finding, predicting, or engineering credible pandemic pathogens will benefit our nation and the world. Thank you.

References

[5] Subbaraman, "US Officials Revisit Rules for Disclosing Risky Disease Experiments"; Willman and Muller, "A Science in the Shadows"; U.S. Congressional Research Service, "Oversight of Gain of Function Research with Pathogens: Issues for Congress."
[6] Sharp, "1918 Flu and Responsible Science."
[7] Willman, "The US Quietly Terminates a Controversial $125m Wildlife Virus Hunting Programme amid Safety Fears."

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