

Why scientists are concerned about leaks at biolabs

May 30 2021, by Issam Ahmed, Lucie Aubourg and Paul Handley



This general view shows the Wuhan Institute of Virology in Wuhan, in China's central Hubei province.

The theory that COVID-19 might be the result of scientific experiments has thrown a spotlight on the work of the world's most secure biolabs.

While the evidence linking SARS-CoV-2 to the Wuhan Institute of Virology in China is strictly circumstantial, a number of experts want tougher controls on such facilities over fears that accidental leaks could touch off the next pandemic.

Here's what you should know.

59 top facilities

The Wuhan lab belongs to the most secure class, commonly referred to as biosafety level 4, or BSL4.

These are built to work safely and securely with the most dangerous bacteria and viruses that can cause serious diseases for which there are no known treatment or vaccines.

"There are HVAC filtration systems, so that the virus can't escape through exhaust; any waste water that leaves the facility is treated with either chemicals or high temperatures to make sure that there's nothing alive," Gregory Koblentz, director of the Biodefense Graduate Program at George Mason University, told AFP.

The researchers themselves are highly trained and wear hazmat suits.

There are 59 such facilities across the world, according to a report Koblentz co-authored that was released this week.

"There are no binding international standards for safe, secure, and responsible work on pathogens," the report, called Mapping Maximum Biological Containment Labs Globally, said.

Accidents do happen

Accidents can happen, sometimes at the top tier facilities, and much more frequently at lower rung labs of which there are thousands.

Human H1N1 virus—the same flu that caused the 1918 pandemic—leaked in 1977 in the Soviet Union and China and spread worldwide.

In 2001, a mentally disturbed employee at a US biolab mailed out anthrax spores across the country, killing five people.

Two Chinese researchers exposed to SARS in 2004 spread the disease to others, killing one.

In 2014, a handful of smallpox vials were uncovered during an Food and Drug Administration office move.

Lynn Klotz, a senior science fellow at the Center for Arms Control and Non-Proliferation, has been sounding the alarm for many years about the public safety threats posed by such facilities.

"Human errors constitute over 70 percent of the errors in laboratories," he told AFP, adding that US researchers have to rely on data from Freedom of Information requests to learn of these incidents.

'Gain of function' controversy

There is disagreement between the US government, which funded bat coronavirus research in Wuhan, and some independent scientists, about whether this work was controversial "gain of function" (GOF) research.

GOF research entails modifying pathogens to make them more transmissible, deadlier, or better able to evade treatment and vaccines—all to learn how to fight them better.

This field has long been contentious. Debate reached a fever pitch when two research teams in 2011 showed they could make bird flu transmissible between mammals.

Harvard epidemiologist Marc Lipsitch told AFP he was concerned "that it would create a strain of virus that if it infected a laboratory worker could not just kill that laboratory worker... but also cause a pandemic."

"The research is not required and does not contribute to the development of drugs or vaccines," added molecular biologist Richard Ebright of Rutgers University, one of the staunchest opponents of this kind of research.

In 2014 the US government announced a pause in federal funding for such work, which gave way in 2017 to a framework that would consider each application on a case-by-case basis.

But the process has been criticized as lacking transparency and credibility.

As late as last year, a nonprofit received funding from the US on research to "predict spillover potential" of bat coronavirus to humans in Wuhan.

Questioned by Congress this week, Francis Collins and Anthony Fauci of the National Institutes of Health denied this amounted to gain of function research, but Ebright said it clearly does.

The path ahead

None of this means that COVID-19 definitely leaked from a lab—in fact there is no hard scientific evidence in favor of natural origin or lab accident scenario, said Ebright.

But there are certain lines of circumstantial evidence in favor of the latter. For instance, Wuhan is around 1,000 miles north of bat caves that harbor the ancestor virus, well out of the animals' flight range.

Scientists from Wuhan were however known to be carrying out routine trips to those caves to take samples.

Alina Chan, a molecular biologist from the Broad Institute, said there were no signs of risky pathogen research dying down in the wake of the pandemic—in fact "it's possibly expanded."

Last year, Chan published research showing that, unlike SARS, SARS-CoV-2 was not evolving fast when it was first detected in humans—another piece of circumstantial evidence that could point to lab origin.

Chan considers herself a "fence-sitter" on the competing hypotheses, but does not favor banning risky research, fearing it would then go underground.

One solution "might just be as simple as moving these research institutes out into extremely remote areas...where you have to quarantine for two weeks before we re-enter in human society," she said.

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