

When science breeds nightmares

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Dangerous research

COLLEGE PARK, Maryland The announcement that an American biologist has tried to create more deadly types of pox viruses in order to develop countermeasures against them raises serious concerns about the lack of control over research involving dangerous pathogens.

The explosion in this type of research after the terrorist and anthrax attacks of 2001 underscores the importance of developing sound oversight mechanisms to ensure that efforts designed to protect the United States against biological attacks do not themselves create new dangers.

The research results announced by Mark Buller of the University of St. Louis at a recent biosecurity conference in Geneva fall squarely in this category. In his work, which was funded by the U.S. government, Buller used biotechnology to deliberately create a more lethal type of mousepox virus, a pathogen affecting mice, and a modified form of the cowpox virus, which can affect humans.

The same techniques could potentially be used to make other pox viruses, including smallpox, more dangerous. Moreover, by revealing the work at a public meeting, rather than in a peer-reviewed journal, Buller side-stepped the new policy announced by journal editors in February to scrutinize manuscripts for information that could facilitate the development of biological weapons.

For the past 18 months, a special committee of the National Academy of Sciences has explored the dual-use nature of biotechnology research - the risk that the same techniques that have revolutionized the treatment of cancer and other terrible diseases could also be used to create new types of biological warfare agents. The committee concluded, in a report released just a week before Buller's announcement, that seven kinds of experiments posed sufficient concern to warrant a review of the proposed work by scientific peers before it is carried out.

One of the experiments of concern outlined by the committee is research that enhances the virulence of a pathogen. Another is research that demonstrates how to defeat vaccines. A third is research that makes a pathogen resistant to antiviral drugs or antibiotics. The modified mousepox virus created by Buller fits all three categories, having reportedly killed all of the mice exposed to the disease, including those that had been vaccinated or given the antiviral drug cidofovir.

The National Academy of Sciences committee recommended that these and other experiments of concern be added to the existing oversight process used by the National Institutes of Health, or NIH, to ensure that biotechnology research is conducted safely.

Unfortunately, only institutions that receive National Institutes of Health funding for biotechnology research are required to follow the institutes' oversight rules. This means that most of the relevant research in private industry, or in government biodefense laboratories, which the National Academy of Sciences singled out as posing particular dual-use problems, would not be covered by the new oversight rules. It also means that experiments of concern in other countries would be exempt from oversight unless their work was being funded by the institutes.

The institutes' rules, moreover, are in the form of guidelines rather than regulations, and are not therefore

legally binding.

Biotechnology research clearly could, in the words of the National Academy of Sciences report, "cause disruption or harm, potentially on a catastrophic scale." This suggests the need for a more robust response, one that is comprehensive, mandatory and applies uniformly on a global scale.

Under a global oversight system, participating governments would be required to establish review bodies to oversee and approve relevant research activities. No institution - whether academic, corporate or government - would be exempt from these oversight requirements. Participating countries would also be required to submit especially dangerous research activities to an international review body for approval.

If we are to reduce the risk that biotechnology research is used for destructive purposes, we must require all institutions that conduct relevant research to adhere to internationally agreed rules.

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