"Identifying and Countering the Use of CRISPR-Cas9 Technology as a Weapons of Mass Destruction (WMD) Platform"

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Technical Research Concept

Background

Biotechnology is advancing at an unprecedented rate all over the modern world. CRISPR-Cas9 now makes it possible to deliberately alter the genome of an organism in both reproductive and non-reproductive cells.[1] The appropriate advancement of this technology can have profound implications on human health. The possibilities of fighting certain diseases once thought incurable are now visible on a scientific horizon. A human trial to cure genetic blindness using this technology by injecting a virus containing CRISPR-Cas9 directly into a patient is even underway.[2] Despite the promise of this new scientific advancement, this technology could be used to create a new wave of biological warfare that is nearly impossible to detect or counter.

Traditional biological and chemical agents evoke an almost immediate reaction by an individual's immune system. A seemingly benign virus encasing CRISPR-Cas9 technology or a similar mechanism could create chronic and fatal diseases that manifested over longer periods of time. The consequences of an entire military unit developing cancer or the same debilitation condition would be profound. Furthermore, the effects would initially be attributed to a standard cause of those condition.

This same technology could also be used as a bioethnic weapon. An adversary could theoretically create a virus that targets certain ethnic genetic markers. The effect of millions of African Americans suddenly developing chronic diabetes or millions of Caucasian Americans suddenly developing Alzheimer would exponentially overwhelm our financial, health and security systems.

A similar type of weapon could also be used to harm various industries such as the agriculture or livestock. The future development of this capability clearly illustrates a cross-nexus of multiple uses as well as good and malign actors.

Statement of Research Work & Relevancy to SI-STT

A hypothetical Statement of Research Work consists of 6 months of independent research on the development of CRISIP-Cas9 technology in both competitor and partner nations, its potential to be developed into a WMD, and identify any emerging technological countermeasures or risk mitigation factors. This research will include but not be limited to research of scientific journals, interviews with academic and industry professionals, as well as relying on the expertise of in-house scientific collaborators. This topic spans across multiple focus and thrust areas and will be of significant value to Defense Industry.

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[1] "What is CRISPR-Cas9" at Your Genome, Sept 12, 2016 accessed at https://www.yourgenome.org/facts/what-is-crispr-cas9, on April 20, 2020.

[2] Heidi Leiford, "CRISPR treatment inserted directly into body for first time," in *Nature,* March 5,2020 accessed at https://www.nature.com/articles/d41586-020-00655-8 on April 21, 2020.

This Research Study will help potential customers to define the threat environment of 2025-2030 by touching 3 areas:

- **Understanding the implications of key strategic competitors' emerging capabilities on the United States' ability to maintain operational advantage and project power.** Identifying and summarizing the key research efforts of strategic competitors in regard to this progressively advancing technology will be critical to understanding how the United States is at risk of maintaining an operational advantage and the ability to project power. In an age where biotechnology is becoming more and more available due to the expansion of multi-national corporations, continued corporate espionage, and coordinated global health responses, it is also imperative that the project highlight advances being made in countries that are not strategic competitors.

- **Identify emerging WMD-related threats of concern for the future battle space.** This emerging technology has the potential to affect both the immediate and strategic battle space by targeting either individuals or whole groups based on the skill and objective of the designer.

- **Consider the role and application of WMD risk reduction tools and approaches.** Because this technology is so new, there may or may not be a fully developed technological tool to effectively counter this type of threat. Developing a metric that helps identify academic institutions and private companies that may best counter this type of threat may prove more useful. Furthermore, there may be procedural or legislative recommendations that can protect the warfighter in the near term.

The primary thrust area of the Research Study is in Emerging Threats; but it will also be relevant to those interested in Competition with Revisionist Powers, Counter Threat Networks (CTN) and Strategic Security and Risk Reduction research.

- **Emerging Threats.** CRISPR-Cas9 technology, particularly if it is combined with Artificial Intelligence (AI) can be a game-changer in terms of advancing human health or eliminating it. The nexus between this technology and AI is not yet understood or has been fully developed.

- **Competition with Revisionist Powers.** This technology could ultimately allow revisionist powers to alter not only a battlefield but an entire society. Since this form of bioweapon can be made to look like a normal disease that develops over time, an adversary can remain anonymous.

- **Counter Threat Networks (CTN).** Priority actors may share their own networks regarding this technological development. Given the potential dual use of this technology, academia, private industry and friendly nations may also be unwitting accomplices.

- **Strategic Security and Risk Reduction**. There may be tools outside of international arms treaties that can help reduce the strategic risk. Russia has long since taken measures to ban the export of human biological samples under the auspices of preventing Western countries from developing a genetic weapon.[3]

The hypothetical deliverables will be a 12-15-page research project (not counting appendices, footnotes, graphs, etc), complementary power-point project, and executive summary. This research project will not only be informative about the scientific developments of CRISPR-Cas9 technology but will also include an operational and strategic vignette of how this technology could be encountered on a future battlefield. The project will also include recommendations for customers to pursuit regarding future projects and further research.

[3]Vasily Vasilov, "Russian clinical research is threatened by ban on export of samples," in *British Medical Journal*, 2007 Jun 16; 334(7606): 1237 accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1892485/#, on April 24, 2020.