

Emerging technologies, like biotechnology, strengthen the Department of Defense (DoD)'s advantages against a range of threats. When the DoD operates in challenging environments where time and distance are barriers to equipping, supplying, and protecting warfighters, biotechnology can provide cost-effective and agile solutions to meet these needs. Robust congressional and departmental support for emerging biotechnology will pay dividends for U.S. national security. The following examples highlight how emerging biotechnology can meet the military's needs for firepower, equipment, and medicines and support the U.S. defense mission.



Photo by DoD

Using bio-based materials: Emerging biotechnology can unlock new manufacturing opportunities for existing and future DoD equipment and material needs, such as high-technology textiles to increase soldier survivability. U.S. Army's Living Materials program has accelerated research into the feasibility of biological materials that can cloak thermal signatures to disguise soldiers from heat-detecting cameras.¹ Biotechnology could also be leveraged to extend the life of existing materials and structures. For example, the DoD's Defense Advanced Research Projects Agency (DARPA) aims to extend the usability of DoD concrete structures by inserting self-repair capabilities with biological systems.²



Photo by Army Spc. Vincent Levelev, DoD

Treating our warfighters with biotechnology: Biotechnology advancements will help save more warfighters' lives in contested environments. DARPA is currently developing a field-deployable, shelf-stable whole blood equivalent via biotechnology. This whole blood equivalent can be used more easily in the field without restrictive shelf-life and cold storage requirements.³ The DoD has also funded research into mobile "tabletop" bioreactors to manufacture biologic drugs on the ground, which would get vital drugs to wounded warfighters faster.⁴



Photo by Air Force Staff Sgt. Stefan Alvarez, DoD

Harnessing biology for firepower: To fulfill mission requirements in locations all over the world, the DoD has to physically transport fuel and energetics where they are needed; in other words, the DoD currently consumes fuel to move fuel and energetics. Biotechnology presents a unique solution to this costly logistics challenge by localizing production through biomanufacturing and the DoD is actively planning to invest in the realization of this future.^{5, 6} Leveraging biotechnology to develop, manufacture, and operationalize energetic materials will ensure more reliable logistics to support warfighter readiness.⁷

Sources

- 1 Tucker, Patrick. "[The US Army is Making Synthetic Biology a Priority](#)"
- 2 DARPA. "[Bio-inspired Restoration of Aged Concrete Edifices \(BRACE\)](#)"
- 3 DARPA. "[DARPA Team Begins Work on Field Deployable Whole Blood Equivalent](#)"
- 4 Weintraub, Karen. "[MIT researchers aim to make drugs on the battlefield](#)"
- 5 Zhang et al. "[Insensitive ionic bio-energetic materials derived from amino acids](#)"
- 6 U.S. Department of Defense. "[Domestic Bioindustrial Manufacturing Investment](#)"
- 7 OUSD R&E, September 20, 2023, Biomanufacturing Industry Day

For any questions about this white paper, or related work at the National Security Commission on Emerging Biotechnology, please contact us at ideas@biotech.senate.gov. Staff at the National Security Commission on Emerging Biotechnology authored this paper with input from the expert Commissioners. The content and recommendations of this paper do not necessarily represent positions officially adopted by the Commission.

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