The Ethics of Biotech in the Military: Enhancing Soldiers or Creating Superhumans?

In recent years, the line between science fiction and science fact has become increasingly blurry-especially in the military. Advances in biotechnology are enabling new forms of human enhancement, from mechanical exoskeletons that increase physical strength to cognitive enhancers that sharpen mental performance. The goal? To create the next generation of soldiers: faster, stronger, smarter. Sometimes referred to in pop culture as “super soldiers.” But beneath the impressive science lies a host of difficult ethical questions. Does enhancing soldiers through biotech cross a moral boundary? Are we protecting lives or turning people into tools of war? And perhaps the biggest question of all: just because we can do something- should we?

The idea of enhancing soldiers isn’t just for Marvel movies anymore. Nations around the world are investing heavily in “human performance optimisation,” blending biotech, pharmacology, artificial intelligence, and robotics. One increasingly common category of enhancement is cognitive enhancers, often in the form of stimulants or experimental drugs. These are designed to help soldiers stay awake, alert, and mentally focused during long missions. For example, modafinil, originally used to treat narcolepsy, has already been given to fighter pilots during extended air missions. Another field of interest is full-body exoskeletons, which are essentially wearable robotic frames that allow soldiers to lift heavy loads, move faster, and reduce injury. Companies like Lockheed Martin and Sarcos Robotics are working closely with military organisations to field-test these systems. Then there’s genetic modification, which, while still mostly in the research phase, theoretically could be used to improve a soldier’s resistance to disease, fatigue, or even mental trauma. These technologies are innovations in the truest sense - but they also raise profound concerns about what it means to be human.

One of the first dilemmas that arises is the difference between treatment and enhancement. If a soldier is injured and receives a prosthetic limb, we consider that a medical treatment. However, if a healthy soldier is fitted with a bionic limb that gives them superhuman speed or strength, that is an enhancement. Ethically, the motivation behind the use matters - are we helping someone recover, or are we pushing the limits of what humans can and should be? Bioethicist Maxwell Mehlman argues that performance enhancement may undermine human dignity and autonomy. “The use of biomedical technology to make individuals better than well may threaten core social values,” he writes. The risk is that enhancement turns people into instruments for national power, not fully autonomous individuals.

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In regular civilian life, informed consent is a cornerstone of medical ethics. But military life operates under different rules. If a commanding officer tells a soldier to take part in a biotech enhancement program, is that soldier truly free to decline? The hierarchical nature of the military makes voluntary participation questionable at best. A 2022 review warns that pressure from superiors can blur the concept of consent in the armed forces. For instance, if a soldier refuses a cognitive enhancer that everyone else is using, they could be seen as a liability.

There is also the concern of equity within both the military and broader society, as these enhancements won't be accessible to every unit or nation equally, where early adopters and elite forces may benefit disproportionately, leaving others at a disadvantage. Once these enhanced individuals leave the military, what happens when they re-enter civilian society? Will they be considered superiors, or be ostracised because of their enhancements? If future employers favour those with biotech upgrades, society may start to expect or even require enhancement, turning it into a form of coercion.

Now here comes the big question: could we lose what makes us human? Arguably, the biggest philosophical concern is whether these advancements risk dehumanising soldiers. Combining genetic tweaks, robotic limbs, and neuro-enhancing implants may challenge our definitions of personhood. Once human nature becomes programmable, we risk losing the very emotions and limitations that make ethical decisions possible in the first place. A soldier who can't feel fear, for example, might be more effective, but also more likely to violate humanitarian laws.

Technology that enhances our own side could easily be flipped to harm others. The same gene-editing technologies used to make soldiers more resilient could also be used to design targeted viruses or genetically engineered plagues. Unfortunately, international laws like the Biological Weapons Convention (BWC) are outdated. Drafted in the 1970s, the BWC did not anticipate technologies like CRISPR or brain-computer interfaces, making global regulation harder and more urgent than ever. Biotech in the military is moving fast, sometimes faster than our ethical frameworks can keep up. While these advancements can improve safety, decision-making, and survival in combat zones, they also risk redefining what it means to be a person, a soldier, and a society. Enhancing human abilities isn't just a scientific breakthrough; it's a moral choice. And it's a decision that shouldn't be left only to governments or generals. The voices of scientists, ethicists, and everyday people, young people especially, need to be part of the conversation, because ultimately, the future of warfare isn't just about who has the best tools - it's about what kind of humans we want to be.

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CITATIONS

1. Buchner, Christina M. Biologically Fit: Using Biotechnology to Create a Better Soldier. Naval Postgraduate School Monterey, 2013. Defense Technical Information Center, https://apps.dtic.mil/sti/tr/pdf/ADA620341.pdf.

2. Delaunay, Jean-Marie. "'Supersoldiers': Ethical Concerns in Human Enhancement Technologies."Humanitarian Law & Policy Blog, 3 July 2017, https://blogs.icrc.org/law-and-policy/2017/07/03/supersoldiers-ethical-concerns-human-enhancement-technologies-2/.

3. Mehlman, Maxwell. "Bioethics of Military Performance Enhancement." Journal of the Royal Army Medical Corps, vol. 165, no. 4, 2019, pp. 226–231. PubMed, https://pubmed.ncbi.nlm.nih.gov/31036747/.

4. Shaffer, Megan, et al. "Ethical Human Augmentation in the Military. " Europe PMC, July 2022, https://europepmc.org/article/ppr/ppr521012.

5. Stanciu, Irina, and Andra Gimiga. "Biotechnological Advancements in Military Operations." Romanian Annals of Fundamental and Applied Chemistry, vol. 3, 2024, pp. 209–225. Sciendo, https://sciendo.com/article/10.2478/rafac-2024-0017.

6. Zajac, Jacek. "Biotechnology and Human Augmentation: Issues for National Security Practitioners. " The Strategy Bridge, 5 Feb. 2019, https://thestrategybridge.org/the-bridge/2019/2/5/biotechnology-and-human-augmentation-issues-for-natio
nal-security-practitioners.