Journal of Law and the Biosciences, 445–448
doi:10.1093/jlb/lsv016
Advance Access Publication 11 June 2015

Response to peer commentaries

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The peer commentaries accompanying our article on military genomics in the December 2014 issue of this journal,[1] while generally endorsing our approach, raise important points to which we would like to respond.

We agree with Evans and Moreno,[2] Pence,[3] and Roberts[4] on the need to avoid overstating the current usefulness of genomic science to the military. However, there are well-accepted, clinically proven current applications of genetic testing that certainly would be useful in military medicine.[5] Moreover, our article is intended to provide guidance for the near future as well as for the present. For example, while Evans and Moreno may be correct that current methods of genomic screening and testing would not add much to existing methods for determining fitness and potential,[6] better understanding

1 Maxwell J. Mehlman & Tracy Y. Li, *Ethical, Legal, Social, and Policy Issues in the Use of Genomic Technology by the U.S. Military*, 1 J. L. & Biosci. 244 (2014).

2 Nicholas G. Evans & Jonathan D. Moreno, *Yesterday's War; Tomorrow's Technology: Peer Commentary on 'Ethical, Legal, Social and Policy Issues in the Use of Genomic Technologies by the US Military'*, 2 J. L. & Biosci. 79, 84 (2014).

3 Charles H. Pence, *Military Genomic Testing: Proportionality, Expected Benefits, and the Connection Between Genotypes and Phenotypes*, 2 J. L. & Biosci. 85, 91 (2014).

4 Jessica L. Roberts, *Good Soldiers Are Made, Not Born: The Dangers of Medicalizing Ability in the Military Use of Genetics*, 2 J. L. & Biosci. 92, 98 (2014).

5 See Kashish Goel et al., *Familial Spontaneous Coronary Artery Dissection Evidence for Genetic Susceptibility*, 175 JAMA Int. Med. 821 (2015); Leslie G. Biesecker & Robert C. Green, *Diagnostic Clinical Genome and Exome Sequencing*, 370 New Eng. J. Med. 2418 (2014); J. Scott Roberts & Wendy R. Uhlmann, *Genetic Susceptibility Testing for Neurodegenerative Diseases: Ethical and Practice Issues*, 110 Prog. Neurobiol. 89 (2013) ('genetic testing could be used to screen for vulnerability to neurological damage following exposure to high-risk environments such as military combat or even contact sports'); Sam Gandy & Steven T. DeKosky, *APOE ϵ4 Status and Traumatic Brain Injury on the Gridiron or the Battlefield*, 4 Sci. Transl. Med. 134ed4 (2012) ('Under [U.S. Department of Defense-Alzheimer's Disease Neuroimaging Initiative], military personnel and veterans at high risk for exposure to IEDs will provide DNA for genetic research (including APOE genotyping) and will undergo serial assessments of cognitive status, brain structure, and a panel of imaging and body fluid biomarkers').

6 Evans & Moreno, *supra* note 2, at 81, 82.

of genomics and epigenetics in the future is likely to improve the predictive value of screening and testing, and we therefore believe that it is useful to begin to consider, as we attempt to do in our article, whether military use of such technological advances would be ethically and legally appropriate.

Pence, on the other hand, seems to argue more categorically that the complexities of human genomics make it impossible in principle to ever determine whether their use by the military would be ethical.[7] While his position is provocative, we do not understand how a current, highly imperfect understanding of human genomics translates into an analytic impossibility for all time. More importantly, if imperfect knowledge were a categorical impediment to making ethical judgements, such as judgements about whether certain military uses of genomics would be proportional in view of the risks and benefits, we wonder how ethical judgements could ever be made in view of the likelihood that information will never be perfect. Therefore, we take from Pence the point that the military must factor in the uncertainty of its information when it makes proportionality judgements, and we encourage a broader discussion of how this should be done.

Evans and Moreno[8] and Roberts[9] caution that genomic screening and testing could reduce genomic variation among warfighters and are particularly concerned that it could lead to discrimination and eugenic practices.[10] We note that military use of any assessment tool could produce similar results, and therefore believe that the issue is less whether the military employs genomic screening and testing and more whether the military inappropriately restricts genotypic and phenotypic variation among its personnel. For example, the military could employ genomic screening to assure greater genotypic variation in its ranks, rather than less. Indeed, although we do not address this issue in our article, we note that having a genotypically heterogeneous military might be particularly important if enemies sought to deploy weapons, such as biological agents, that attacked specific genotypes. We also agree with Roberts that the military must carefully evaluate its use of personalized genomic information in light of the appalling history of eugenics.[11]

In contrast to the other commentators, Savulescu is far more supportive of the military's use of genomic science. In particular, he believes that soldiers ethically can be subjected to substantial genomic research risks, comparable to the risk of dying in combat, without obtaining their informed consent.[12] Instead, he believes, it would be sufficient if they were asked to give general consent prior to enlistment.[13] However, we continue to affirm the need for obtaining consent prior to actually conducting experiments for the reasons stated in our article, which include the widespread consensus on the need for universal application of the principles embodied in the Nuremberg Code and Belmont Report and the importance of avoiding public backlash against military research and military service more broadly, such as the adverse publicity that

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7 Pence, *supra* note 3, at 87, 91.

8 Evans & Moreno, *supra* note 2, at 83.

9 Roberts, *supra* note 4, at 97.

10 Evans & Moreno, *supra* note 2, at 41, 42; Roberts, *supra* note 4, at 93, 98.

11 See generally Maxwell J. Mehlman, *Modern Eugenics and the Law*, in A Century of Eugenics in America 219, 240 (Paul Lombardo ed., 2010).

12 Julian Savulescu, *Science Wars: How Much Risk Should Soldiers Be Exposed To in Military Experimentation?* 2 J. L. & Biosci. 99, 104 (2014).

13 *Id.* at 102.

accompanied disclosures about military radiation experiments and anthrax vaccination program.[14] In another article, one of us also argues that anticipatory consent of the type Savulescu approves is likely to be ineffective at alerting enlistees to the research risks that they may encounter.[15]

Savulescu makes an interesting argument that high-risk research using military subjects should be allowed for defensive purposes but not for purposes of developing more lethal offensive weapons.[16] The distinction between offensive and defensive uses of genomic research is elusive, however, and rests mainly on the intended use of a genomic weapon rather than its nature. Consider, for example, an (admittedly fanciful) research program aimed at developing a means of altering warfighters' DNA to radically reduce their need for sleep. A successful research result could increase defensive vigilance against attack or contribute to the success of an offensive engagement.[17] In either case, we maintain that the risk to military subjects must be outweighed by the benefit. In this connection, Savulescu states that "exposing soldiers to 'biomedical risks' is never in their interests … any more than active combat is."[18] Although he is correct that the primary objective of formal biomedical research is to produce generalizable knowledge rather than to benefit subjects, he overlooks that the military may choose to test the safety and efficacy of genomic technologies on deployed troops, as it did with pyridostigmine bromide and BT vaccine during the first Gulf War,[19] in which case the military would be hoping to produce both generalizable knowledge and personal benefit to warfighters.

In connection with the possibility of using genomic technology to enhance warfighters, Evans and Moreno note as we do that the military must carefully consider the consequences if enhanced individuals leave the military.[20] They specifically fear that the military might seek to control enhanced individuals' civilian lives to prevent them from becoming security risks.[21] Evans and Moreno do not explain what actions the military might take to reduce the risks, however. In our article, we mention the possibility that an enhancement effect could be removed or reversed at the end of military service,[22] and one reason for requiring this to be done might be in response to Evans' and Moreno's concern. In the end, though, the issue is whether restrictions on former service personnel imposed by the military are reasonable in light of the security threat. Military personnel in possession of classified information, for example, are prohibited from disclosing that information following discharge and must submit planned publications for government review.[23]

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[14] See Mehlman & Li, *supra* note 1, at 10, 12.

[15] Maxwell J. Mehlman & Stephanie Corley, *A Framework for Military Bioethics*, 13 J. Mil. Ethics 331, 339 (2014).

[16] Savulescu, *supra* note 11, at 103.

[17] See JASON, The Mitre Corp., *Human Performance*, Mar. 2008, at 76 https://www.fas.org/irp/agency/dod/jason/human.pdf (accessed May 2, 2014).

[18] Savulescu, *supra* note 11, at 101.

[19] See Mehlman & Corley, *supra* note 14, at 340, 341.

[20] Mehlman & Li, *supra* note 1, at 37; Evans & Moreno, *supra* note 2, at 83, 83.

[21] Evans & Moreno, *supra* note 2, at 83, 84.

[22] Mehlman & Li, *supra* note 1, at 37.

[23] See, e.g., 32 C.F.R. § 2001.80 (2014); 32 C.F.R. § 154.61 (2014); Exec. Order No. 13,526, 75 Fed. Reg. 707 (Dec. 29, 2009); Department of Army, Reg. No. 380-5, Security: Department of the Army Information Security Program, paragraph 6–2, paragraph 6–5 (Sep. 29, 2000); Department of Defense, DoD Directive No. 5230.09: Clearance of DoD Information for Public Release (Aug. 22, 2008); Snepp v. United States, 444 U.S. 507 (1980).

On one final note, Savulescu misstates our position on whether warfighters who are injured as a result of participating as research subjects should be eligible for compensation under the *Feres* doctrine. He states that we 'appear to support the principle … that soldiers should not be eligible'.[24] In our article, we merely describe the current law, which denies compensation, and we point out that it has been criticized.[25] In fact, we agree with Savulescu that both civilians and members of the military should be compensated for research-related injuries.

In conclusion, we are grateful for the valuable insights provided by our colleagues and appreciate having this opportunity to write this response.

[24] Savulescu, *supra* note 11, at 102.

[25] Mehlman & Li, *supra* note 1, at 21.