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David J. Western

Gabriel J. Chin

ARTICLE

THE GATTACA MODEL: SHOULD THE MILITARY BE ALLOWED TO SELECT ITS ELITE FORCES BASED UPON ONE'S DNA?

David J. Western[†] *& Gabriel J. Chin*[††]

Since the beginning of warfare, every weapon ever invented has been used on the battlefield.[1] In an effort to counter each weapon, warriors have devised unique and creative methods to protect themselves.[2] Notwithstanding the creativity of these mechanisms, the most effective weapon is still the person behind each instrument of war. For this reason, modern militaries have developed a specific type of soldier capable of enduring and fighting in the most difficult and challenging of situations.[3] In the United States, these special soldiers are often referred to as just that: the Special Forces. Each branch has their own particular über fighter. Whether it be the Green Berets, the Navy Seals, or the Air Force Para-Jumpers, these are the ultimate fighting

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† Colonel David J. Western, USAF; Retired. Currently serves as Associate Dean for Administration and Student Development at Liberty University School of Law.

†† Professor Gabriel J. Chin, Edward L. Barrett Jr. Chair and Martin Luther King Jr. Professor, of Law, UC Davis School of Law.

1. Consider the following examples: Mustard gas was ubiquitous during WWI. Nuclear Weapons were used on Nagasaki and Hiroshima. The British bombed Gruinard Island with Anthrax spores as a test of biological weapons, and actual biological weapons (blankets containing smallpox) were used against Native Americans in 1763 during the siege at Fort Pitt. Even environmental modification was attempted during the Vietnam War. *See, e.g.*, Eleanor Cummins, *With Operation Popeye, the U.S. Government Made Weather an Instrument of War,* POPULAR SCIENCE (Mar. 20, 2018), https://www.popsci.com/operation-popeye-government-weather-vietnam-war. Fears over the real possibility of using the weather as a weapon of war culminated in the Environmental Modification Treaty. *See*, Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, Dec. 10, 1976, 1108 U.N.T.S. 151, https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVI-1&chapter=26&lang=en.

2. *See, e.g.*, Timothy G. Bosse, *Advanced Protection Technology for Ground Combat Vehicles*, 20 J. AM. ACAD. ORTHOPAEDIC SURGEONS (2012); *see also*, Murray G. Hamilton & Paul M. Lundy, *Medical Countermeasures to WMDs: Defence Research for Civilian and Military Use*, 233 TOXICOLOGY 8, 8-12 (2007).

3. The Russians have the "Spetsnaz"; Chinese train the "People's Liberation Army Special Operations Force"; even developing countries like Cameroon have groups like the "Battalion d'intervention rapide, or BIR." *See also* Military & Defense Team, *The 8 Most Elite Special Forces in the World,* BUS. INSIDER (Apr. 17, 2017), https://www.businessinsider.com/most-elite-special-forces-in-on-earth.

weapon systems.[4] Because each of these soldiers cost on average over a million dollars to train,[5] at first blush it would only make sense to limit the selection process to only those the United States deems capable of a significant return on this investment. Attrition from strenuous training helps, but why not narrow the field even further before the first push-up? Who we are is determined to a large extent by one's DNA. In the movie *Gattaca*,[6] Andrew Nichol (the author and director) explored the notion of genetic selection as the primary means of determining one's fate, job, and future in society. The notion was indeed futuristic. However, now that the science is catching up with science fiction, the question must be asked: Should the military be allowed to discriminate amongst Special Force candidates using DNA? In other words, have we reached the time when "the Gattaca" principle should apply?

Part I of this article discusses the legality of genetic discrimination in the military and the applicability of the Genetic Information Nondiscrimination Act.[7] Additionally, because certain forms of genetic discrimination have at one point been legitimized in the military context, the article will explore the logic and legality of those areas. Finally, Part I will attempt to address whether the science is even at a stage where accurate decisions could be made based upon a review of the human genome.

Part II explores whether genetic discrimination should be extended to specific specialties within the military, and how such criteria for genetic exclusion could be made. Dangers of a plan to exclude based on DNA will then be discussed. Part II concludes with the argument that because future threats to national security are unknown, even an effective genetic discrimination strategy would ultimately prove ineffective. Protection from one threat does not equal protection from all threats. Therefore, the dangers of misapplied eugenics would far outweigh the utility of specialized selection.

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4. *See, e.g.*, most books by Dick Couch.

5. *See, e.g.*, Clyde Haberman, *Special Ops Forces: How Elite Forces Became Military Muscle,* N.Y. TIMES (Sept. 25, 2017), https://www.nytimes.com/2017/09/25/us/special-ops-retro.html.

6. GATTACA (Columbia Pictures and Jersey Films 1997).

7. Genetic Information Nondiscrimination Act, Pub. L. No. 110-233, 122 Stat. 881 (2008).

I. LEGALITY OF GENETIC DISCRIMINATION IN THE MILITARY

A. GINA and Genetic Discrimination in the Workforce

From the beginning of the Human Genome Project (HGP) in the early 90s, ethical concerns have become common place regarding the use of one's genetic data.[8] In 1991, Wisconsin was the first state to enact certain forms of protection regarding the use of such information.[9] But the federal government was slow to follow suit. Congress attempted to address these concerns throughout the mid-90s, but these efforts were largely unsuccessful.[10]

In May of 2008, President George W. Bush signed into law the Genetic Information Nondiscrimination Act (GINA) and thereby established a clear wall of protection for civilians seeking employment from being discriminated against based upon their DNA.[11] Nevertheless, GINA was enacted "preemptively, with little evidence indicating that there was actual [genetic] discrimination taking place on a large scale at the time."[12] Instead, GINA relied on the perception that scientific advances following the work on the HGP would not only provide benefit to medicine by early discovery of disease, but also provide an opportunity for discrimination in the workplace. An employer could avoid paying an employee's medical bills by either

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8. Susannah Baruch & Kathy Hudson, *Civilian and Military Genetics: Nondiscrimination Policy in a Post-GINA World*, 83 AM. J. HUM. GENETICS 435, 436 (2008).

9. *Id.* at 437

10. *See id.* ("In 1996, Congress passed the Health Insurance Portability and Accountability Act (HIPAA), which included two specific provisions putting in place some restrictions on group health insurers' use of health-related information in making coverage decisions and setting premiums. Congress specifically recognized and listed genetic information as protected health information . . . . In the workplace setting, the Equal Employment Opportunity Commission (EEOC) has interpreted the Americans with Disabilities Act (ADA)—in particular its protection of people who are 'regarded as' having a disability—to provide some protections from the use of genetic information by employers. In one United States Supreme Court decision, *Bragdon v. Abbott*, the Court ruled that people with HIV infection may be covered under the ADA even if they are free of symptoms. In a dissenting opinion, Chief Justice Rehnquist wrote that the argument adopted by the majority opinion, 'taken to its logical extreme, would render every individual with a genetic marker for some debilitating disease "disabled" here and now because of some future effects.' In part because of that dissenting opinion, some questioned whether the ADA would in practice provide meaningful protection against genetic discrimination if challenged in court." (citations omitted)).

11. *Id.*

12. Stephanie A. Kostiuk, *After GINA, NINA? Neuroscience-Based Discrimination in the Workplace*, 65 VAND. L. REV. 933, 974 n.276 (2012).

refusing to hire someone with an errant genotype or terminating someone who was likely to develop a late stage genetic disorder.[13]

Among the protections provided, GINA bans health insurers from eligibility or premium determinations based upon one's genetic information.[14] Likewise, it stops an insurer from requiring individuals to undergo genetic testing or using genetic information when making employment decisions.[15] It also prohibits employers from requesting genetic information about employees or their family members.[16]

GINA is not, however, all-encompassing. It does not prevent doctors from recommending genetic tests, mandate coverage for any particular test, or prohibit medical underwriting based upon a patient's current health status.[17] It also does not cover life, disability, or long-term care insurance.[18] Finally, and significantly, GINA does not apply to the military.[19]

B. Legality of Genetic Screening in the Military

Notwithstanding GINA's lack of applicability to the Department of Defense (DoD), each military branch has its own protections in place.[20] These

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13. *See, e.g.*, *id.* at 940 ("The reports and testimony prepared in the context of the congressional debates surrounding GINA recognized that these scientific advances in genetics, while promising, were not without potential problems. The knowledge and tools stemming from the HGP provided new opportunities for medical progress. Most notably, discoveries about the genetic bases of illness allowed for earlier detection of illness and for the development of more effective therapies to treat disease. However, these advances also gave rise to the potential misuse of genetic information to discriminate against or to stigmatize individuals in the workplace. For instance, an employer may choose to penalize prospective or current employees merely because they have a higher probability of contracting a certain disease or disorder in the future." (citations omitted)).

14. Kathy L. Hudson et al., *Keeping Pace with the Times—The Genetic Information Nondiscrimination Act of 2008*, 358 NEW ENG. J. MED. 2661, 2661-63 (2008).

15. *Id.* at 2662.

16. *Id.*

17. *Id.*

18. *Id.*

19. *See* Baruch & Hudson *supra* note 8, at 438 ("GINA does not include protection from genetic discrimination in life insurance, disability insurance, or long-term-care insurance. GINA also does not apply to members of the United States military, to veterans obtaining healthcare through the Department of Veterans Affairs (VA), or to the Indian Health Service because the laws amended by GINA do not apply to these groups and programs.").

20. *See, e.g.*, AFI 36-2706 at ¶ 1A.1.1.1 ("It is against Air Force policy for any Airman, military or civilian, to unlawfully discriminate against, harass, intimidate or threaten another Airman on the basis of race, color, religion, sex, national origin, age, disability, reprisal, or genetic information."); AR 690-12, ¶ D1.A.

policies could be easily amended or repealed, and they only provide a limited safeguard. Further, the type of proscribed discrimination outlined in military regulations pertains primarily to equal opportunity for those already in military service. They do not apply to all restrictions on accession, retention, or early termination based upon a disqualifying medical condition.

Genetic privacy in the DoD is also trumped within the realm of military necessity. Identification of a soldier's remains is one such example. Currently, all U.S. service members must provide a DNA sample upon entering the military.[21] This information is stored should the service member die in combat and his or her remains need to be identified. Originally, this was the primary motive for the sample storage. However, a provision in the 2003 National Defense Authorization Act provided access to the DNA repository for certain limited law enforcement purposes.[22] Over the years some service members have challenged the legitimacy of this repository and argued that the forced samples violate one's Fourth Amendment rights. Courts, however, have ruled the collection is not an "unreasonable" search and seizure.[23]

The debate over the legality of forced DNA does not stop there. Some have expressed concerns about fundamental fairness should the military decide that a new gene discovery must prompt an involuntary discharge for those who possess the errant strand.[24] Or that as a health care provider, the military may be violating its doctor-patient relationship should a forced DNA collection lead to the discovery of a condition a patient would not want disclosed.[25] Finally, many have expressed concern about whether a service member really gives informed consent to all the usages of a mandatory DNA sample.[26]

Specifically, there are several incidents where a DNA sample might reveal conditions that would prohibit a service member from performing certain duties, and thereby prohibit that member from a full gambit of career choices. Susannah Baruch and Kathy Hudson from the Johns Hopkins Genetics and

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21. U.S. Dep't of Def., DoD directive 5154.24, Armed Forces Inst. of Pathology (2003).

22. Department of Defense Authorization Act, 10 U.S.C. § 1565a (2003).

23. *See, e.g.*, Mayfield v. Dalton, 901 F. Supp. 300 (D. Haw. 1995), *vacating as moot*, 109 F.3d 1423 (9th Cir. 1997). Originally, plaintiffs (marines) first alleged that the collection, storage and use of DNA samples taken without their consent violated their "right to freedom of expression, privacy, and due process under the First, Ninth, and Fifth Amendments to the United States Constitution," but their arguments and other filings indicated more clearly that they believed their Fourth Amendment rights were violated.

24. Sarah Gill, *The Military's DNA Registry: An Analysis of Current Law and a Proposal for Safeguards*, 44 NAVAL L. REV. 175, 204 (1997).

25. *Id.* at 212.

26. *Id.* at 204-19.

Public Policy Center provide the following description of a new military entrant's genetic examination:

> All individuals entering the military also receive genetic tests for sickle cell anemia and G6PD (Glucose 6-phosphate dehydrogenase) deficiency (M.H. Fries, personal communication). The military may use the test results to ensure the safety of enlisted individuals by keeping them from environments or jobs that are believed to trigger disease or exacerbate health concerns. By determining such susceptibilities, the military hopes to prevent injury or disruption of duty. A positive test result for a genetic disorder is noted on a service member's dog tags and in his or her medical records, which superiors consult before making assignments and promotions.[27]

The tests mentioned by Baruch and Hudson are not new. In fact, sickle cell anemia first became a concern for the military back in 1969[28] when four recruits died during training that took place at altitudes the Navy considered "moderate."[29] Each of these recruits were known to be carriers of the "sickle cell trait" (SCT) found during a medical prescreening to determine whether they might later develop sickle cell anemia. After the event, the Navy implemented SCT screening for all recruits and later began restrictions for positive carriers that included proscriptions from certain types of aviation, diving depths, Special Forces training, and high-altitude parachuting.[30]

Although the connection between SCT and altitude was tenuous at best, the DoD continued to test for SCT and implement restrictions based upon a positive result until 1981.[31] At that point, based upon conflicting evidence, restrictions imposed upon soldiers due to positive SCT results were dropped.[32] However, in the mid-1990s, deaths of Air Force recruits led the DoD to revisit the issue. But once again, paltry evidence of any connection between SCT and morbidity led instead to a recommendation for routine screening, but not mandatory limits upon career options.[33] In 1996, the Under Secretary for Defense for Personnel and Readiness promulgated an

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27. *See* Baruch & Hudson, *supra* note 8, at 439 (citations omitted).

28. Mauricio De Castro et al., *Genomic Medicine in the Military*, 1 NPJ GENOMIC MED. 1, 1 (2016).

29. *Id.* at 1-2. Moderate was considered >4,060 feet.

30. *Id.* at 2.

31. *Id.*

32. *Id.*

33. *Id.*

opinion that indicated testing for SCT should not be mandatory.[34] Currently, the Services do conduct SCT tests but instead of mandatory restrictions, positive examinees are given counseling to avoid certain rigorous activity and are advised to avoid low-oxygen and locations with increased air-pressure.[35]

The controversy surrounding SCT examinations extends beyond causality between high altitudes or low oxygen and the susceptibility of carriers. Positive SCT results have also been used as a basis for racial discrimination. "During the 1970s, African Americans were forced to undergo screening for sickle cell anemia as a condition for school attendance and marriage licenses."[36] Those with positive tests were in some cases denied employment even though they may never have developed the disease.[37] To respond to this disparate treatment, Congress enacted the Sickle Cell Anemia Control Act of 1972 making screening voluntary.[38] While this may have addressed the immediate concern of the time, even today, the utility of SCT testing is hotly contested as the dangers of using the information for improper purposes may raise their heads.

G6PD deficiency testing has a similar backstory. Unlike SCT testing which is now optional for each military department, G6PD deficiency screening is mandatory for all service members.[39] Individuals with a deficiency in glucose-6-phosphate dehydrogenase, or G6PD, have a higher risk of complications when treated for malaria.[40] Traditionally, the treatment of malaria requires the use of the drug *primaquine* which kills malaria parasites living in body tissues.[41] G6PD-deficient persons often experience hemolysis (the rupture or destruction or red blood cells) when administered this medication.[42] For that reason, soldiers likely to deploy to a region where malaria is present may experience life-threatening trauma simply because of medication used to prevent malaria. To avoid this complication, the military decided that

34. Castro, *supra* note 28, at 2.

35. *Id.*

36. *See* Baruch & Hudson, *supra* note 8, at 436.

37. *Id.*

38. *Id.*

39. U.S. Dep't of Def., DoD instruction 6465.01 ¶ 3(b), Erythrocyte Glucose-6-Phosphate Dehydrogenase Deficiency (G6PD) and Sickle Cell Trait Screening Programs (2015).

40. Clinton K. Murray, *Prevalence of Glucose-6-Phosphate Dehydrogenase Deficiency in U.S. Army Personnel*, 171 MIL. MED. 905, 905 (2006).

41. *Id.*

42. *Id.*

soldiers must be screened for G6PD deficiency before being considered "world-wide" capable.[43]

G6PD-deficient current and potential service members may already be discriminated against regarding accessions, future assignments, and potential disability benefits when identified as deficient. But this "genetic imperfection" is only one of several that science has the ability to discover through early detection. For over 20 years, doctors have been able to conduct predictive testing for Huntington Disease.[44]

> Huntington's is a horrific disease, and it has a very straightforward and well-understood genetic cause. Along the HTT gene, on chromosome 4, there is a series of nucleotides, CAG, which codes for the amino acid glutamine. This series repeats itself over and over within the gene (e.g., CAG, CAG, CAG). For the vast majority of people, this series repeats itself fewer than 35 times, and for these people the number of repeats appears to have no biological consequence. For other people, however, the series may repeat itself anywhere from 36 to more than 100 times. When the repeating sequence is this long, the gene creates a mutant form of the huntingtin protein, which will almost certainly lead to Huntington's disease if the carrier lives long enough.[45]

Unlike most diseases, where genetic identification may only be a part of a medical diagnosis, Huntington Disease is a malady that can almost entirely be discovered by a simple genetic test. For this reason, many patients refuse to undergo such testing out of fear of genetic discrimination.[46] In the military context, many service members are discharged and later unable to obtain disability benefits for the disease, because diagnosis presumes a "pre-existing" condition. In one case a 22-year-old soldier was medically discharged from military service after his father was diagnosed with Huntington's. Suspecting inheritance of the errant gene, "[a] neurologist at Walter Reed Army Medical Center ordered a genetic test for Huntington's, and it turned up positive . . . [the soldier] was discharged . . . even though . . .

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43. *See supra* note 39.

44. Yvonne Bombard et al., *Engagement with Genetic Discrimination: Concerns and Experiences in the Context of Huntington Disease*, 16 EUR. J. HUM. GENETICS 279, 279 (2008).

45. STEVEN J. HEINE, DNA IS NOT DESTINY: THE REMARKABLE, COMPLETELY MISUNDERSTOOD RELATIONSHIP BETWEEN YOU AND YOUR GENES 80 (2017).

46. *See* Bombard *supra* note 44, at 279.

there was expected to be another 25 years before he would display any symptoms."[47]

There is no question that the military may lawfully test for numerous genetic conditions, and they are allowed to do so for numerous different reasons. Whether it be for simple identification of remains or for pre-service screening and disability benefits, genetic discrimination is already occurring. The prescient question is, therefore, how far should this form of genetic discrimination go?

C. The Future of Genomics and Implications for Military Advancement

Advances in genetic technology are already influencing military leadership. "[H]igh-level officials in the Pentagon with responsibility for health policy have expressed at least a theoretical interest in any [predictive] tools that might help the services manage the impact of common diseases such as diabetes, orthopedic issues, and mental illness (e.g., post-traumatic stress disorder and depression) . . . ."[48] Unfortunately, genomics and predictive DNA testing is not yet at a state where any reliable test can be used to foresee such illnesses or conditions. Early detection of those predisposed to PTSD, for example, is one area the military would greatly benefit from a genetics-based test.[49] However, the science for such an exam is simply not there.

The primary reason science cannot genetically predict complex illnesses and conditions like PTSD is because, unlike Huntington's, the condition cannot be narrowed down to one gene, or even one segment of genes. Very few illnesses can be pin-pointed to one or even a few delinquent genes. There are known cases of a fatal flaw in a single gene that cause detrimental health conditions. For example, *fibrodysplasia ossificans progressive* (FOP) occurs in one out of every 2,000,000 births. Because of a genetic malfunction in one gene, the DNA sequence of the carrier tricks the body into "growing bone wherever it was repairing some other tissue damage, such as from a cut or

47. Karen Kaplan, *U.S. Military Practices Genetic Discrimination in Denying Benefits*, L.A. TIMES (Aug. 18, 2007), https://www.latimes.com/archives/la-xpm-2007-aug-18-sci-genes18-story.html; *see also* Gill, *supra* note 24, at 204 (another example of a soldier discharged due to Huntington's).

48. Baruch & Hudson, *supra* note 8, at 440.

49. Gabriel Lazaro-Munoz & Eric T. Juengst, *Challenges for Implementing a PTSD Preventive Genomic Sequencing Program in the U.S. Military*, 47 CASE W. RES. J. INT'L L. 87, 89 (2015).

bruise."[50] A person suffering from FOP may ultimately experience his or her skeleton fusing together.

Such genetic abnormalities cause some to believe that every human trait or condition can be narrowed down to one specific gene. However, the human body does not work like that. When Johann Mendel first discovered the study of genetics, the simplicity of his pea plant experiments could very well have been misleading. During his studies, Mendel cross-fertilized different varieties of peas, and thereby discovered the concept of inherited characteristics in plants.[51] Had Mendel experimented on more complex organisms, his research may have never reached fruition.

Consider a human's height. Most people believe one's DNA is the primary factor in determining the height of a child. Contrary to this, Professor Steven J. Heine makes a compelling argument that epigenetics and environment play a larger role in our human development than most would expect.[52] Professor Heine cites dairy consumption as one such example of an environmental influence. In 1865, the average American male was 5'8", compared to the average Dutchman who stood at 5'5".[53] Today, Dutchmen are among the tallest men in the world with an average height of 6'1".[54] A simple examination of the Netherlands' improved social-economic conditions over the past decades, along with the Dutch's now-high milk consumption rate, one of the highest in the world, demonstrates that dairy is indeed a factor impacting a person's standing in the world.[55] People are not just what DNA declares them to be.

Notwithstanding geneticists' limitations, the world is intrigued by the possibilities of altering fate by modifying or transforming DNA. One researcher claims that in 10 years an individual could be able to learn French by simply consuming a pill designed to modify his or her DNA.[56] Chinese researchers are already working to produce designer babies using CRISPR[57]

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50. HEINE, *supra* note 45, at 26.

51. *Id.* at 12.

52. *See id.* at 31-34.

53. *Id.* at 32.

54. *Id.* at 31.

55. *Id.* at 32; *see, e.g.*, Lisa C. Ikemoto, *The Racialization of Genomic Knowledge*, 27 SETON HALL L. REV. 937, 942 (1997) ("The idea of a genetic causal link is becoming so pervasive that we read every condition as potentially attributable to genetics.").

56. Samir Salama, *In a Decade, You Can Learn French by Eating a Pill*, GULF NEWS: UAE (Dec. 12, 2018), https://gulfnews.com/uae/in-a-decade-you-can-learn-french-by-eating-a-pill-1.60903016.

57. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR).

technology to genetically modify embryos with the ultimate goal of developing the perfect child.[58]

Forensic genetics is also reaching new stages of advanced technology. Soon criminal investigators may be able to profile suspects and produce a culprit's photographic-type image (think mugshot) from only a small DNA sample.[59] Then using DNA databases, police will be able to find the perpetrator by a simple search.[60]

The technology for creating Frankenstein-like beings from designer DNA may seem like a distant nightmare. Still, the science fiction fantasy of developing a super soldier may one day soon become a reality. Nevertheless, even if a designer soldier could be fashioned, modern militaries would no doubt prefer not waiting 20 or more years for the mega warrior to mature. Instead, in the race for military superiority, it is feasible that even the U.S. military could use genetic discrimination to select its top troops from amongst a database of DNA candidates.

Such a temptation can certainly spawn from what we already know about predictive genetics. If a desired Special Forces superstar were to be chosen with as much embedded protection from biological attacks as possible, science could make the argument that certain genetic classes should be avoided. Consider, "[f]or example, Tay-Sachs and Gaucher's disease are commonly found among Ashkenazi Jews, sickle cell anemia most often affects people of African heritage, and Family Mediterranean Fever is frequently found in Armenians."[61] The ugliness of eugenics mixed with scientific inquiry could lead to a query such as: "Should those DNA strands be avoided?" The answer is a resounding and intuitive no, but with science progressing faster than the bioethics attached to its discoveries, these questions might, unfortunately, one day be raised.

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58. Antonio Regalado, *EXCLUSIVE: Chinese Scientists are Creating CRISPR Babies*, MIT TECH. REV. (Nov. 25, 2018), https://www.technologyreview.com/s/612458/exclusive-chinese-scientists-are-creating-crispr-babies/.

59. Caitlin Curtis et al., *Dramatic Advances in Forensics Expose the Need for Genetic Data Legislation*, CONVERSATION (Dec. 20, 2018), https://theconversation.com/dramatic-advances-in-forensics-expose-the-need-for-genetic-data-legislation-105397.

60. *Id.*

61. Elizabeth Reiter, *The Department of Defense DNA Repository: Practical Analysis of the Government's Interest and the Potential for Genetic Discrimination,* 47 BUFFALO L. REV. 975, 1009 (1999).

Science has already demonstrated that a pharmacogenetic test can be used to prevent a specific toxic effect of a drug.[62] Other tests can prevent a genetically susceptible individual from developing a life-threatening disease by ensuring avoidance of certain chemicals.[63] Taken to the extreme, a military pharmacogenetic test could be used to select only individuals for its elite forces who will be less susceptible to certain chemical attacks. Since 1997, the military has required soldiers to receive the anthrax vaccination when deployed to certain conflict regions of the world. The fear of biological weapons usage promulgated this requirement.[64] Theoretically, such vaccinations would be superfluous if only soldiers genetically immune to anthrax were sent into battle. Such a possibility is not outside the realm of science. Recent studies have shown that the susceptibility of rats to anthrax toxins can be narrowed down to one gene.[65] One day scientists might be able to find unique soldiers who possess a genetic structure that arms him or her with an inborn genetic defense based upon a lack of the gene that causes toxin susceptibility.

Alternatively, military strategists might wish to recruit special soldiers who possess warrior-friendly type genes. Some scientists believe to have found "genetic predispositions to certain behaviors, claiming to have discovered a 'violent gene,' a 'warrior gene,' and a 'monogamy gene.'"[66] Professor Heine, however, disparages such findings. In particular, with regard to the warrior gene, he points out the following:

> [A]ny labels like "the warrior gene" are highly problematic because they suggest that this gene is specifically associated with violence. It's not, just as the alleles from other genes do not only have one outcome. Pleiotropy is the term for how a single genetic variant can influence multiple different phenotypes. MAOA [the warrior gene] is highly pleiotropic: the traits and conditions potentially connected to the MAOA gene include Alzheimer's, anorexia, autism, body mass index, bone mineral density, chronic

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62. *See* Simon Mallal et al., *HLA-B*5701 Screening for Hypersensitivity to Abacavir*, 358 NEW ENG. J. MED. 568, 568 (2008) ("HLA-B*5701 screening reduced the risk of hypersensitivity reaction to abacavir.").

63. Andrew P. Fontenot et al., *Beryllium-Induced Hypersensitivity: Genetic Susceptibility and Neoantigen Generation*, 196 J. IMMUNOLOGY 22, 22 (2016).

64. Meryl Nass, *The Anthrax Vaccine Program: An Analysis of the CDC's Recommendations for Vaccine Use*, 92 AM. J. PUB. HEALTH 715, 716 (2002).

65. Zachary L. Newman et al., *Susceptibility to Anthrax Lethal Toxin-Induced Rat Death Is Controlled by a Single Chromosome 10 Locus That Includes rNlrp1*, 6 PLOS PATHOGENS 1, 6 (2010).

66. Kostiuk, *supra* note 12, at 939 (internal citations omitted).

> fatigue syndrome, depression, extraversion, hypertension, individualism, insomnia, intelligence, memory, neuroticism, obesity, openness to experience, persistence, restless leg syndrome, schizophrenia, social phobia, sudden infant death syndrome, time perception, and voting behavior. Perhaps it would be more fitting to call MAOA "the everything but the kitchen sink gene."[67]

Clearly, even with all the genetic advances over the past several decades, the overall study is still in its infancy. Nevertheless, every day advanced technology moves ahead with lightning speed. Back in 1958, it is unlikely Watson and Crick could have predicted the multitude of uses their research with DNA would have engendered.[68] Likewise, only the imagination can begin to understand the limits of future genetic research. Therein lies the ultimate question of this paper, if scientists do discover the true "warrior gene" or at least a "warrior genetic test" should the rule of law allow genetic discrimination in order for the military to weaponize it?

II. RECOMMENDATION FOR PROHIBITION AGAINST SUCH DISCRIMINATION

A. Heroes Don't Need Special DNA

In 1924, a young man was born in Hunt County, Texas. He was abandoned by his father and later orphaned by his mother.[69] With little prospects for success, he likely faced a future as an unskilled vagabond.[70] World War II changed all that. With unmatched bravery, and facing certain death, Audie Murphy racked up various medals for bravery, courage under fire, and valor. He ultimately earned thirty-seven medals, including the Congressional Medal of Honor.[71] Though no genetic testing was conducted to determine whether Audie Murphy had the "warrior gene," few could have ever predicted the supernatural success a young drifter from Texas had during World War II.

Another unlikely hero emerged from the small town of Lynchburg, Virginia. Desmond Doss was born on February 7, 1919, to William Thomas

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67. HEINE, *supra* note 45, at 195 (internal citations omitted).

68. The authors subscribe to the belief that Rosalind Franklin was the first to discover DNA, not Watson and Crick, as they based their research on her work. *See* BRENDA MADDOX, ROSALIND FRANKLIN: THE DARK LADY OF DNA (2002).

69. DON GRAHAM, NO NAME ON THE BULLET: A BIOGRAPHY OF AUDIE MURPHY 19 (1989).

70. *Id.* at 20.

71. *Id.* at 101.

Doss and Bertha Edward Oliver Doss.[72] "Theirs was a simple working-class family—his father was a carpenter and his mother a shoemaker."[73] Corporal Desmond Doss became legendary after risking his life on countless occasions to save soldiers on both sides of the battlefield. What made him unique was that he was a conscientious objector who refused to carry a weapon.[74] His religious faith forbade him from violence, yet he still felt compelled to join the military in order to serve his fellow men by providing medical assistance.[75] Desmond's most famous act of heroism occurred during an assault upon the Maeda Escarpment on the island of Okinawa on May 4, 1941.

> Later that day came the event that defined Doss' valor on the battlefield and earned him the Medal of Honor. Men of the 1st battalion attacked and destroyed an enemy bunker complex, but a furious Japanese barrage and counterattack drove this unit back over the escarpment with heavy losses. For the next 5 h [sic], Doss remained forward of the lines to locate, care for, and individually evacuate 75 wounded Americans. Using available ropes and a litter technique that he had devised back in training, Doss fashioned a sling that secured each man's legs through loops and doubled around the chest. This worked perfectly and ensured that lowering the wounded over the jagged cliff would not result in any additional injuries. Throughout this ordeal, Doss repeatedly exposed himself to heavy enemy fire and sometimes hid himself from Japanese soldiers sent to kill the wounded. The next day, Doss braved enemy artillery fire to aid an American artillery officer who had been wounded; and even later crawled to within 25 yards of an enemy cave to treat and recover a wounded soldier, pulling him back 100 yards to safety despite continuous enemy fire.[76]

Corporal Doss's story was recently given further notoriety by Mel Gibson's depiction in the movie *Hacksaw Ridge*.[77] The amazing strength and courage demonstrated by Corporal Doss is nothing short of amazing. It is indeed

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72. Mark Weisenmiller, *I Would Rather Save Life*, AMERICA IN WWII, at 26 (Apr. 2018).

73. William C. Puddy et al., *Revisiting Desmond Doss (1919–2006): Merging Combat Medicine and Benevolence on the Battlefield*, 56 J. EMER. MED. 114, 115 (2018).

74. *Id.*

75. *See* Weisenmiller, *supra* note 72, at 26.

76. Puddy, *supra* note 73, at 117 (internal citations omitted).

77. HACKSAW RIDGE (Pandemonium Pictures 2016).

possible that Desmond had some special DNA that made him one of the most revered heroes in the annals of military lore, but he came from a simple background and lived among people that, in the early 1910s–1930s, were not considered special by anyone.

In fact, only a few short miles from Desmond Doss' home in Lynchburg, Virginia, was the home of another famous resident. Her name was Carrie Buck. On January 23, 1924, Carrie was involuntarily committed to the Virginia Colony for Epileptics and Feeble-Minded in Madison Heights, Virginia (just two miles from Lynchburg). She was placed in this institution on the grounds of feeblemindedness, incorrigible behavior, and promiscuity.[78] Her commitment to this institution was in large part due to the insistence of Carrie's landlord who wanted to hide his son's rape of Ms. Buck.[79] Carrie was later sterilized according to Virginia's 1924 Preservation of Racial Integrity Act which promoted two distinct eugenicists' goals of forced sterilization for those with undesirable genes and prevention of interracial marriages.[80]

> Carrie's commitment and sterilization was partially due to her pregnancy out of wedlock, demonstrating, according to the State, loose morals. Carrie's mother, physically abused and abandoned by her husband, chose prostitution for income, also, according to the state, exhibiting undesirable traits. Eugenics supporters, therefore, argued that Carrie represented two generations of defective genes that burdened and threatened the state's welfare.[81]

Carrie Buck challenged the validity of her forced sterilization (due to genetic inferiority) and her case ultimately reached the Supreme Court.[82] Because the eugenics movement was primarily responsible for bringing the case to court in order to sanction and validate the goals of the eugenics movement, it was no surprise (at the time) that the Supreme Court upheld Carrie's forced sterilization.[83] Oliver Wendell Holmes delivered the 8-1 majority opinion in the case and, upholding the state's interest in sterilizing

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78. Phillip D. Kline, *Imprisoning the Innocent: The "Knowledge of Law" Fiction*, 12 LIBERTY L. REV. 393, 453 n.325 (2018) (citing *The Supreme Court and the Sterilization of Carrie Buck*, FACING HIST. & OURSELVES, https://www.facinghistory.org/resource-library/supreme-court-and-sterilization-carrie-buck (last visited Apr. 17, 2018)).

79. *Id.*

80. *Id.* at 453.

81. *Id.* at 453 n.325.

82. Buck v. Bell, 274 U.S. 200 (1927).

83. Kline, *supra* note 78, at 453 n.325.

those who might be a genetic drain on society, famously declared, "[t]hree generations of imbeciles are enough."[84]

Desmond Doss was fortunate that, although poor, his family was stable. Had his mother come from a less reputable environment, it is possible the Virginia Colony for Epileptics and Feeble-Minded would have committed her. Thankfully, history records a different outcome for Corporal Doss and the 75 or more survivors he was responsible for saving on the battlefield in Okinawa.

B. Slippery Slope of Selective Genetic Discrimination

While determining who is eligible to join the military's elite forces using a DNA sample is a scientific possibility, the dangers of "Carrie Buck-like" consequences are far too real. As the legal and moral disasters of eugenics and scientific racism show, misapplied Mendelian genetics is a dangerous road to travel.[85] It is one thing to consider non-complex organisms and apply pea-plant simplicity, it is quite another to predict human behavior through one's genome. Genetic determinism is, therefore, a great threat when considering whether selection to any special group should be based upon DNA. As Professor Jessica Roberts declares:

> A genetically deterministic view holds that if you have a gene for X condition or trait, you will manifest that condition or trait. However, human beings are complex organisms and, even with a genetic proclivity, a variety of other factors affect whether an individual actually develops a particular attribute. Thus, genetic determinism reduces this complex reality to a simple conditional statement: If you have the genetic variation, then you will manifest the trait or condition.[86]

In the previous section, Desmond Doss and Audie Murphy were used as examples to demonstrate how DNA databanks are not necessary to find

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84. *Buck*, 274 U.S. at 207.

85. *See, e.g.*, ADAM COHEN, IMBECILES: THE SUPREME COURT, AMERICAN EUGENICS, AND THE STERILIZATION OF CARRIE BUCK (2016); THOMAS C. LEONARD, ILLIBERAL REFORMERS: RACE, EUGENICS, & AMERICAN ECONOMICS IN THE PROGRESSIVE ERA (2016); Janet L. Dolgin, *Personhood, Discrimination, and the New Genetics*, 66 BROOK. L. REV. 755 (2001); Herbert Hovenkamp, *Social Science and Segregation Before Brown*, 1985 DUKE L.J. 624 (1985); Dorothy E. Roberts, *The Genetic Tie*, 62 U. CHI. L. REV. 209 (1995); Keith E. Sealing, *Blood Will Tell: Scientific Racism and the Legal Prohibitions Against Miscegenation*, 5 MICH. J. RACE & L. 559 (2000).

86. Jessica L. Roberts, *'Good Soldiers Are Made, Not Born': The Dangers of Medicalizing Ability in the Military Use of Genetics*, 2 J.L. & BIOSCIENCES 92, 94 (2015).

heroes. "Common-stock" genetic men and women can spring forth and bloom into magnificent warriors. Both Desmond and Audie may never have been discovered, had the presence on the battlefield been determined by a "warrior gene." Furthermore, even if a test was used to screen soldiers for desirable warfighting traits, the current state of genetics could only "indicate the likelihood—not the reality—of exhibiting those qualities."[87]

The dangers of such screenings are worse than the ineffectiveness of genetic determinism. If genomic screenings became widespread, positive genetic results could supplant true measures of military valor. "Instead of evaluating individuals across a variety of metrics—physical strength, agility, problem-solving skills, maintaining calmness under pressure, etc.—relying too heavily on that technology could collapse assessment into a battery of genetic or genomic tests."[88]

Additionally, determining which genes are the right ones to emulate would almost automatically engender skewed results. The U.S. military has a high percentage of men and women of European descent.[89] A genetic test may end up being based upon the standard set by one race or racial trait. It could therefore unfairly exclude many individuals as genetic "matches" would not necessarily be present amongst other individuals of different ethnic backgrounds.[90] Finally, deterministic tests have been used by the military in the past to differentiate between individuals based upon perceived inherent traits. These tests, like that of the intelligence test, proved only to justify social disparity, not uncover excellence.[91]

Carl von Clausewitz, studied by any serious military scholar at all levels of military strategy, professed that there was only one trait that could dissipate the fog and friction of war. That trait was not the "warrior gene" nor something that could be inborn. He called it "habit."

> Habit gives strength to the body in great exertion, to the mind in great danger, to the judgment against first impressions. By it a valuable circumspection is generally gained throughout every rank . . . .
>
> As the human eye in a dark room dilates its pupil, draws in the little light that there is, partially distinguishes objects by degrees, and

87. *Id.* at 96.

88. *Id.* at 96-97.

89. *Id.* at 95.

90. *Id.*

91. *Id.*

> at last knows them quite well, so it is in War with the experienced soldier, whilst the novice is only met by pitch dark night.[92]

Experience is truly the only method by which a soldier can become a valiant warrior. Current technology can hope to identify genes that would give an advantage to individuals in their pursuit to become superior warriors, but no genetic test can counter Clausewitz's almost 200-year-old wisdom in that it takes habit and experience to become an elite soldier.

C. Epigenetics Demands Legal Protection from Genetic Discrimination.

DNA is too complex to allow for any type of simple and unwarranted discrimination. Just because a person may have a particular faulty gene, it does not mean that a person will develop an infirmity from it. Consider Dr. Kenneth Pelletier:

> Gene expressions are almost always mediated by our epigenome. You may inherit a strange gene or generate a mutant nucleotide that codes for a specific disease, but . . . if this unit of your DNA stays in the off position, the change it codes for will never express itself; on the other hand, environmental or lifestyle factors may turn the gene on.[93]

Dr. Pelletier further explains that while a single gene can lead to a rare disease, many illnesses such as "breast cancer, heart disease, and even the majority of Parkinson's cases can be traced to unfortunate combinations of a set of *normal* genes."[94] If, therefore, science has not yet reached a stage where it can definitively ascertain the "warrior-gene," nor can it determine with absolute certainty the consequence of an errant code sequence, or even what happens with odd combinations of normal genes, genetic preference should not be a legitimate consideration.

The concept of epigenetics further demonstrates the speciousness of most arguments for genetic discrimination. Science has demonstrated that each individual shapes his or her genome on a daily basis by the decisions they make.[95] Thus, like Clausewitz's concept of habit, the more one practices a trait, the more like that trait the person becomes. Taken in the military context, the more a military power trains an individual, the more "special"

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92. CARL VON CLAUSEWITZ, ON WAR 52 (Feather Trail Press ed., 2009).

93. KENNETH R. PELLETIER, CHANGE YOUR GENES, CHANGE YOUR LIFE: CREATING OPTIMAL HEALTH WITH THE NEW SCIENCE OF EPIGENETICS 30 (2018).

94. *Id.* at 31.

95. *Id.* at 40-41.

that individual becomes. Going to the extreme of pre-selecting elite forces based upon perceived genetic traits provides no guarantee that individual will continue to further refine the genetic material upon which he or she was selected. In other words, the miraculous nature of a human body provides a great deal of individual free will. Free will, when exercised with proper training, can modify one's own genetic makeup.

Furthermore, the dangers of taking action upon perceived genetic deficiencies can have drastic ramifications. Citing *Scientific American*, Dr. Pelletier points out that "millions of men have gotten unnecessary biopsies, surgery, and radiation as a result of taking the PSA [prostate specific antigen] test."[96] Fear over the potential for cancer, that really was too remote, led to this rush to react. Similar consequences may emerge should the military rush to react in its selection process for its elite forces. Not only may they miss an opportunity to bring a true hero (who may simply be missing a fantasy gene), but they may also select the wrong type of individual based upon faulty data.

Finally, politics, battlefields, threats, and enemies change. Selecting an individual based upon his or her genome may make sense for one threat (e.g., immunity from the Anthrax spore), but it does not equate to protection from all threats. Strong and effective militaries need diversity. If a selection process narrowed down candidates to only those who show genetic immunity to certain chemicals or viruses, those individuals are rendered superfluous should those chemicals not be used on a battlefield. Having a team filled with diverse soldiers from diverse background provides the best possible defense from the greatest number of threats. Combine the concept of epigenetics with proper training and the perfect soldier could indeed be fashioned from a DNA *tabula rasa*.

D. Recommendations.

Selection for any special program, to include all elite forces, should be made based upon demonstrated quality and not genetic desirability. Actual physical and mental disabilities should be permitted as a basis for medical disqualification, but no genetic "guess" should be allowed as a basis for elite force ineligibility. To address this concern, each branch of the U.S. military should immediately update its own service-specific instructions or regulations outlining the prohibition of using genetic tests as a screening tool for all acquisitions, including special programs, and further including selection among its elite forces. As Commander-in-Chief, the President of

96. *Id.* at 41 (quoting John Horgan, *Why I Won't Get a PSA Test for Prostate Cancer*, SCI. AM. (June 14, 2017)).

the United States[97] could immediately direct the Department of Defense to incorporate this guidance into service-specific regulations. Congress could also direct this change as a part of any independent legislation or inclusion within its annual National Defense Authorization Act. Proposed language in such regulation or legislation might include: "Unless otherwise provided, no genetic screening may be used (in whole or in part) to select for service members for enlistment or any competitive program based upon a perceived desirable [or undesirable?] gene."[98]

Because the science behind genetic screening is advancing faster than the law (in most areas), transparency should also be pursued. Congress or the President could require each military branch to develop training designed to teach every service member just how their mandatory DNA samples are being used. The law already protects "personally identifiable information" or PII via statutes like the Privacy Act of 1974.[99] Similarly, genetic information is protected under the umbrella of the Health Insurance Privacy and Portability Act (HIPPA).[100] But more could be done to ensure individuals truly provide informed consent before his or her DNA is used for anything that might personally affect them.

CONCLUSION

San Antonio, Texas, is home to the "Audie Murphy Veterans Administration Hospital," named after one of the most famous heroes in America's past. Audie Murphy, like Desmond Doss and countless others, emerged on the battlefield as unlikely legends. Few could have predicted their success. While modern militaries would infinitely prefer to know which of their recruits were destined for greatness, science has not yet reached the point where a genetic screening could be the answer. America's military is formidable not because the United States selected only the best genetic make-up for its troops. America's military is formidable because it is made up of a vast network of diverse backgrounds, strengths, ethnicities, and multiple genetic variations. Clausewitz would likely have found the concept of *Gattaca* as mere fiction. The best and most elite forces are not a product of their genome. They are a product of habit and experience. Indeed, elite forces are made, not born.

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97. *See* U.S. CONST. art. I, § 2, cl. 1.

98. The language "unless otherwise provided" could arguably open a door for exceptions to consume the rule. However, the intent for an exception provision would be to allow for medical disqualification amongst service members who have certain dangerous genetic traits considered reliable (the protein for Huntington's etc.).

99. 5 U.S.C. § 552a (1974).

100. *See* 45 C.F.R § 160.103; 45 C.F.R § 164.501.