

Military Gene Therapy: An Examination of the Probability the US or Russia Would Enhance their Soldiers

A Monograph

by

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Abstract

Military Gene Therapy: An Examination of the Probability the US or Russia Would Enhance their Soldiers, by MAJ Samuel R. Broaddus, 56 pages.

Throughout history, governments have sought ways to boost the performance of their soldiers on the battlefield. Many areas of study have been examined to improve performance, including more lethal weapons technology, better and lighter soldier equipment, academic training, and improvements to physical performance. Of these, physical fitness is closely tied to performance in combat related tasks. A 2008 study examining weight training and Army standardized physical training in soldiers demonstrated significant performance improvements in combat related tasks. This improvement in task performance implied that soldiers would be able to act and react in combat more quickly than less physically fit peers or adversaries who were physically slower and weaker. The US Army has searched for ways to improve the physical fitness and performance of soldiers on the battlefield, and to return them to duty after injury. One of the latest examples being implemented is the Army Combat Fitness Test, to be fielded in 2020. This new test is a clear effort to improve the physical readiness of soldiers for combat. Other recent efforts include opportunities under Congressionally Directed Medical Research Programs to develop regenerative medicines. An avenue with vast potential that is being explored through medical research is gene therapy. This study conducted case study analysis of the US and Russia regarding state sponsorship of performance-enhancing drugs in the Olympics and examined the influence of special interest groups and the state of legislation on military gene therapy use in either country. The study used this analysis to estimate the potential for implementation of military gene therapy in the US or Russia.

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Introduction

Background of the Study

Throughout the course of history, governments have sought ways to boost the performance of their soldiers on the battlefield. Many areas of study have been examined to improve performance, including more lethal weapons technology, better and lighter soldier equipment, academic training, and improvements to physical performance. Of these, physical fitness is closely tied to performance in combat related tasks. A 2008 study examining weight based training and Army standardized physical training in soldiers demonstrated significant performance improvements in combat related tasks.¹ This improvement in task performance implied that soldiers would be able to act and react in combat more quickly than less physically fit peers or adversaries who were physically slower and weaker.

The US Army has continually searched for ways to improve the physical fitness and performance of soldiers on the battlefield, and to return them to duty after injury. One of the latest examples being implemented is the Army Combat Fitness Test, to be fielded in 2020. This new test is a clear effort to improve the physical readiness of soldiers for combat. Secretary of the Army Mark T. Esper described the previous Army Physical Fitness Test as capturing “maybe 30 or 40 percent relevance of what you demand in combat,” while stating that the new Army Combat Fitness Test captures “upwards of 80 percent.”² Other recent efforts include opportunities under Congressionally Directed Medical Research Programs to develop regenerative medicines.

¹ Everett A. Harman, David J. Gutekunst, Peter N. Frykman, Bradley C. Nindl, Joseph A. Alemany, Robert P. Mello, and Marilyn A. Sharp, "Effects of Two Different Eight-Week Training Programs on Military Physical Performance," *Journal of Strength and Conditioning Research* 22, no. 2 (February 2008): 524, accessed March 1, 2020, <https://lumen.cgscarl.com/login?url=https://search-proquest-com.lumen.cgscarl.com/docview/213060243?accountid=28992>.

² Department of Defense, “New Fitness Test Measures Combat Readiness, Army Secretary Says,” *Army News Service*, September 7, 2018, accessed January 23, 2020, <https://www.defense.gov/Explore/News/Article/Article/1623884/new-fitness-test-measures-combat-readiness-army-secretary-says/>.

Another avenue with vast potential that is being explored through medical research is genetic therapy.

Following the first sequencing of the human genome in 2003, researchers in the United States and around the world devoted significant resources toward developing technologies building upon the results of genetic research.³ In the intervening sixteen years, genetics associated research resulted in the advent of technologies with the potential to change the way medical treatment of disease and other conditions was approached. This approach became known as Gene Therapy.⁴ There are now hundreds of clinical trials currently ongoing to evaluate gene therapy to ameliorate genetic conditions.⁵

Several promising avenues of gene therapy have been developed, to include clustered regularly interspaced short palindromic repeats (CRISPR), which allows precise editing of genetic material. The use of CRISPR, and variations like it, have the potential to improve the physical performance of soldiers in warfare, to return them to active duty more quickly following injury, and to keep them fit on active duty for longer durations. This has serious implications and potential advantages for nations that successfully weaponize CRISPR or other gene therapies to advance soldier performance on and off the battlefield. Soldiers enhanced with gene therapy may hold a competitive advantage in lethality, be able to fight for longer periods of time, and remain on duty longer than unenhanced counterparts. The cumulative advantage in individual soldier capability has the potential to be decisive in determining the outcome of conflict.

The first military to effectively deploy gene therapy for soldier enhancement will develop a competitive advantage. However, research hasn't identified which countries are likely to

³ "2003: Human Genome Project Completed," National Human Genome Research Institute, accessed March 1, 2020, <https://www.genome.gov/25520492/online-education-kit-2003-human-genome-project-completed>.

⁴ "What is Gene Therapy?," National Institutes of Health Genetics Home Reference, accessed December 10, 2020, <https://ghr.nlm.nih.gov/primer/therapy/genetherapy>.

⁵ "Is Gene Therapy Available to Treat my Disorder?," National Institutes of Health Genetics Home Reference, accessed March 3, 2020. <https://ghr.nlm.nih.gov/primer/therapy/genetherapy>.

implement gene therapy technology militarily. Most commentary has focused on the morality and safety aspects of genome altering drugs. There are a multitude of country specific factors including history with performance enhancing drugs, government legislative processes and law, and the status of medical research that might affect the probability of gene therapy development for warfare. Gene therapy has the potential to greatly impact the resilience and performance soldiers on the battlefield, and the first country to have access to functional gene therapy technology will seize a technological advantage ahead of their peers. Fears are emerging that gene editing could initiate a “biomedical duel” or arms race between the US and other countries.⁶ The country to win the biomedical contest to develop effective gene therapy in soldiers could seize and hold the initiative in combat. The purpose of this study will be to examine the predisposition of the US or Russia to implement gene therapy as a state-sponsored activity, and to predict the first country to implement the technology.

Definition of Terms

To provide clarity, this study provided definitions for several key terms discussed throughout the course of the paper. The primary sources for these definitions include the National Institutes of Health (NIH), the National Center for Biotechnology Information (NCBI), and World Anti-Doping Association (WADA).

Gene Therapy

Gene therapy is defined as the experimental technique which uses genes to treat or prevent disease.⁷ It is believed that gene therapy could be used in the future as a potential treatment for medical disorders, in lieu of the use of conventional drugs or surgery. The National Institute for Health discusses three current applications which are being explored, including

⁶ David Cyranoski, "CRISPR Gene Editing Tested in a Person," *Nature* 539, no. 7630 (2016): 479, accessed March 1, 2020, <https://www.nature.com/news/crispr-gene-editing-tested-in-a-person-for-the-first-time-1.20988>.

⁷ “What is Gene Therapy?,” National Institutes of Health Genetics Home Reference.

replacing a mutated gene with a copy of a healthy one, inactivating an improperly functioning or mutated gene, and introducing a new gene to help fight off disease.⁸

Gene Doping

The definition of gene doping has evolved over time within the World Anti-Doping Association, beginning with its initial placement on their prohibited list in 2004. The current definition includes the use of polymers of nucleic acids, or nucleic acid analogues, as tools to alter genome sequences, including the transcriptional or epigenetic regulation of gene expression, for the purpose of enhancement to sports performance.⁹

CRISPR

CRISPR stands for clustered regularly interspaced palindromic repeats. It is currently the preeminent gene editing technology. It has two components, a guide ribonucleic acid (RNA) to find the target gene, and a CRISPR associated protein 9 endonuclease to break the double-stranded DNA for the purpose of permitting changes to the genome.¹⁰

This study tested several hypotheses that gene therapy would be used by US peer adversaries such as Russia to shift the balance of power. First, great power competition means states will use all available means to increase their perceived military capability to achieve a balance of power in their favor. Second, that the probability of military's using performance enhancing technologies can be estimated by past state sponsorship of performance enhancing drug use among elite Olympic athletes. Third, that the structure of their military scientific research organizations indicates an effort to develop gene therapy technology for implementation.

⁸ "What is Gene Therapy?," National Institutes of Health Genetics Home Reference.

⁹ Michaela Oravitan, "Current Threats on Gene Doping – a Systematic Review," *Timisoara Physical Education and Rehabilitation Journal* 11, no. 21 (2018): 29, accessed March 1, 2020, <https://doi.org/10.2478/tperj-2018-0013>.

¹⁰ Melody Redman, Andrew King, and David King, "What is CRISPR/Cas9?," *Archives of Disease in Childhood Education and Practice Edition* 101, no. 4 (August 2016): 213, accessed March 1, 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4975809/>.

Research Questions

This study is focused by one primary and five secondary research questions. The primary research question is does the US or Russia's behavior during past use of performance enhancing drugs allow for the estimation of future gene therapy application in the military? This primary research question attempts to demonstrate the presence and characteristics of systematic state-sponsorship of performance-enhancing drugs in international events such as the Olympics, and link their use to propensity to use similar performance enhancing gene therapy technology in the military.

The first secondary research question examines the current form and function of organizations within militaries to find and develop indicators of military gene therapy development. Are there organizations within the US or Russian militaries tasked to conduct research to develop gene therapy for use in the military? Second, has the US or Russia been found in violation of Olympic doping rules? Third, has the US or Russia conducted state sponsorship of performance enhancing drugs in the Olympics? Fourth, are there special interest groups in the US or Russia influencing potential gene therapy use? Lastly, what is the current state of legislation regarding gene therapy in Russia and the US?

This study has one significant limitation; it lacks access to Russian documents which are written or recorded in their native language and have not been translated. This necessarily limits the perspective of available documents to either those written in the English language or those translated into English. It also limits potential refuting documentation regarding state intentions on the part of Russia in relation to state-directed doping. Delimitations in this study are primarily related to the depth of historical data examined regarding evidence for state-sponsored Olympic doping. This paper limits itself to Olympic events taking place from 1967 to 2018. This period was chosen because this is when illegal performance enhancing doping was recognized as a significant issue within the Olympics.

There are six sections within this body of work. Section one is the introduction, comprised of the study background, statement of the problem, purpose of the study, definition of terms, theoretical framework, research questions, limitations, delimitations, and the assumptions of the study. The second section is comprised of a review of the current relevant literature, outlining an introduction to gene therapy applications, the use of performance enhancing drugs in sport, perspectives on great power competition, current legislation on gene therapy, evidence of military focused gene therapy research, and evidence of state sponsored use of performance enhancing drugs during Olympic events. The third section provides the methodology used for the study. It outlines a selection of case studies for the use of performance enhancing drugs in the Olympics, and the procedures used for analysis. The fourth section is the analysis of the Russian case study which includes an examination of the initial hypothesis, and answers to the research questions. The fifth section gives the same case study treatment to the US question. Lastly, the sixth section summarizes the study, including potential applications for the findings in future research, theory, and practice, and presents the conclusion.

Section II: Review of the Literature

Introduction

The potential for technology to edit the human genome was set in motion with the discovery of the DNA double helix, first examined in 1953.¹¹ The modern use, however, definitively begins with the completion of the human genome project in 2003. Thomas Hudson described the objective of the study in 1998, where the purpose was to sequence the three billion DNA bases, and the 100,000 genes that comprise the twenty-three human chromosomes.¹²

Performance Enhancing Drugs in Sport

Understanding why elite athletes such as those at the Olympics chose to enhance their performance, despite the consequences, is necessary to begin forming the linkage between gene therapy and doping in the military. Athletic performance enhancement has been recorded as far back as the Greek Olympiads.¹³ Usage continued into modernity with the use of coca leaf extract to stave off fatigue and hunger during the late nineteenth century. In terms of the way experts consider modern use of drugs in sports, the Olympics during the 1960s first evidenced the use of steroids for anabolic purposes.¹⁴ According to Thomas Murray, this use increased their competitive advantage by building additional muscle, and nowhere was this more evident than in the Olympics.¹⁵ The Montreal Olympics in 1976 continued to see the use of anabolic drugs. The push to use steroids was so strong that athletes who refused were seen as disruptive to the team

¹¹ Thomas J. Hudson, "The Human Genome Project: Tools for the Identification of Disease Genes," *Clinical and Investigative Medicine* 21, no. 6 (December 1998): 268.

¹² *Ibid.*, 267.

¹³ Thomas H. Murray, "The Coercive Power of Drugs in Sports," *Hastings Center Report* 13, no. 4 (August 1983): 24, accessed March 1, 2020, <https://www.jstor.org/stable/3561718>.

¹⁴ *Ibid.*, 24.

¹⁵ *Ibid.*, 25.

effort.¹⁶ Murray postulated that the reasoning behind the use of anabolic drugs lied in the nature of international competition, that athletes would do anything to increase performance.¹⁷

The classic examination of athletes using performance enhancing drugs was evaluated in the Goldman dilemma. Robert Goldman found that half of the athletes surveyed responded they would use performance enhancing drugs even though it would result in their death in five years.¹⁸ Goldman's study indicated a propensity for athletes to exploit a short term advantage over a longer term loss. Juan Gonzalez, in a later study, found opposing results. Gonzalez found that overall athlete willingness to accept risks imposed by performance enhancing drugs was low. In an online survey of 2,888 athletes, elite Olympic athletes were the most willing to accept fatal cardiovascular risk to win a gold medal; however, the overall percentage was low, at 9 percent.¹⁹ The weakness in his survey was that athletes were given the choice of using performance enhancing drugs with the understanding that it would increase cardiovascular mortality in the form of a heart attack. It is possible that an awareness or consideration of mortality may not be made by elite athletes in actual conditions existing during Olympics training, or that the drives to win are more pressing. A different result is offered by Connor, who, in a different survey on performance enhancing drug use, reported that 25 of 212 athletes would use performance enhancing drugs if no consequences were present.²⁰ In Connors examination, this number decreased substantially as factors such as illegality and the potential for death were taken into consideration.²¹

¹⁶ Murray, 25.

¹⁷ Ibid., 26.

¹⁸ James Connor, "Would they Dope? Revisiting the Goldman Dilemma," *Br J Sports Med* (January 2013): 1, accessed March 1, 2020, <https://bjsm.bmj.com/content/47/11/697>.

¹⁹ Juan Gonzalez, "Trading Health Risks for Glory: Reformulation of the Goldman Dilemma," *Sports Med* 48 (2018): 1963, accessed March 1, 2020, <https://doi.org/10.1007/s40279-018-0881-9>.

²⁰ Ibid., 1964.

²¹ Ibid.

Social Aspects to Performance Enhancing Drug Use

Strulik argued athletes used performance enhancing drugs because they believed or knew that other athletes were doping, and that doping was an accepted part of the culture which enabled successful competition.²² According to Strulik, the use of performance enhancing drugs became a requirement to succeed, and was seen as a part of the normative framework of the culture.²³ Strulik's research implied a competitive culture that accepted performance enhancing drugs, and accepted significant risks to win.

Nancy Reichman and Sefiha, in a comparison of performance enhancement in cycling and derivatives trading, drew parallels between enhancing performance among dissimilar cultures, such as might be made between Olympic athletes and the military.²⁴ They noted that athletes and financiers received significant rewards when enhancing their performance and that the rewards were pursued in the short term with little regard to long term consequences.²⁵ This matched some of the implications of Goldman's earlier study. Reichman and Sefiha argued that technologies to improve performance for financiers, and performance enhancing drugs in sport, created a new normal competitive sphere where performance enhancement was essentially required to compete.²⁶

The nature of great power competition will also influence the likelihood that militaries would seek to employ gene therapy. Great power competition is similar to observations by Baum and Singh in their examination of organizational adaptation. They stated that organizations may

²² Holger Strulik, "Riding High: Success in Sports and the Rise of Doping Cultures," *The Scandinavian Journal of Economics* 114, no. 2 (2012): 541, accessed March 1, 2020, <http://www.jstor.org/stable/41679520>.

²³ *Ibid.*, 542.

²⁴ Nancy Reichman, "Regulating Performance-Enhancing Technologies: A Comparison of Professional Cycling and Derivatives Trading," *Annals of the American Academy of Political and Social Science* 649 (2013): 99, accessed March 1, 2020, <http://www.jstor.org/stable/23479125>.

²⁵ *Ibid.*, 99.

²⁶ *Ibid.*, 102.

respond to threats and opportunities in the competitive environment by changing their organizational strategy and structure to enhance performance.²⁷ As understood by Wishnick through the competition lens, the US has increasingly competed with Russia and China for respective standing and access to central Asia, a location where Russia and China are attempting to limit US military presence.²⁸ According to Wohlforth, this competition may be driven by perceived social status and rank between nations.²⁹ He stated that as unipolarity decreases on the part of the US, status ambiguity will drive increasing competition.³⁰ Wohlforth's stance is in line with the social theory of Thayer, who stated that competition among organizations arises from the needs of similar resource requirements, with competition increasing the more resources are similar.³¹

One method nation states use to prevent conflict during great power competition is deterrence. Robert Haffa stated that deterrence will continue to play a role in preventing conflict, and defined deterrence as "the manipulation of an adversary's estimation of the cost/benefit calculation of taking a given action."³² Haffa recognized that the 2018 national security and defense strategies were based on a perceived environment with increased competition and disorder along a broad front, one where conflict between nations has many opportunities to arise.³³ He argued that the return of great power competition means the US must have a capable

²⁷ Joel A. C. Baum, "Dynamics of Organizational Responses to Competition." *Social Forces* 74, no. 4 (1996): 1261, accessed March 1, 2020, <https://doi.org/10.1093/sf/74.4.1261>.

²⁸ Elizabeth Wishnick, "Report: Russia, China, and the United States in Central Asia: Prospects for Great Power Competition and Cooperation in the Shadow of the Georgian Crisis," *Strategic Studies Institute*, US Army War College, (2009) iii, accessed March 1, 2020, <http://www.jstor.org/stable/resrep11652>.

²⁹ William C. Wohlforth, "Unipolarity, Status Competition, and Great Power War," *World Politics* 61, no. 1 (2009): 30, accessed March 1, 2020, <http://www.jstor.org/stable/40060220>.

³⁰ *Ibid.*, 20.

³¹ Wohlforth, 51.

³² Robert P. Haffa, "The Future of Conventional Deterrence: Strategies for Great Power Competition," *Strategic Studies Quarterly* 12, no. 4 (2018): 94, accessed March 1, 2020, <https://www.jstor.org/stable/26533617>.

³³ *Ibid.*, 94.

force perceived as able to achieve victory, that “small but very powerful, precise, intense, and survivable forces” will play a significant role in this deterrence.³⁴ Harrison Schramm and Timothy Walton argue, however, that the US often relies upon an illusory advantage in capability or technology.³⁵ They stated that adversaries often have superior technological and conceptual capabilities in comparison to the US, and that other states are capable of stealing US technology to address differences.³⁶

³⁴ Haffa, 106.

³⁵ Harrison C. Schramm, and Timothy A. Walton, “Risk Perspectives in the Era of Great Power Competition,” *Phalanx* 51, no. 4 (December 2018): 42, accessed March 1, 2020, <https://www.jstor.org/stable/10.2307/26553374>.

³⁶ *Ibid.*, 42.

Systems, Form, and Function

Robert Axelrod and Michael Cohen defined a complex adaptive system as one wherein “a system contains agents or populations that seek to adapt.”³⁷ Within these systems they also described the concept of agents within complex systems, where agents represent persons, organizations, or even countries. For example, Olympic athletes have always existed within their own competition regulating organizations internal to their country while also participating within the Olympics regulated by the International Olympic Committee. Athletes, countries, and sports governing organizations are all agents within the complex adaptive system. Axelrod and Cohen also described agents as having properties, which include location, capabilities, and memory.³⁸ Under this concept, agents operate within a strategy, which is at its essence a means of operating within the context, or how agents use their means to pursue their ends.³⁹ They noted that “A nation seeking to promote favorable norms might try to lead by example.”⁴⁰

Axelrod and Cohen argued that system strategies morph over time in response to a “measure of success.”⁴¹ Agents and strategies exist within populations, learning from the actions of other like agents within the population.⁴² Over time, strategies go through a process of selection to be used in the complex adaptive system processes, where successful selection drives adaptation.⁴³ Adapted strategies that are perceived as available and successful are emulated by other agents within the complex system, be it a business or nation.⁴⁴ Axelrod and Cohen’s model may be applied to the context of Olympic doping and military gene therapy. Countries that

³⁷ Robert M. Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (New York: Basic Books, 2000), 7.

³⁸ *Ibid.*, 4.

³⁹ *Ibid.*

⁴⁰ *Ibid.*

⁴¹ Robert Axelrod and Michael D. Cohen, 5.

⁴² *Ibid.*, 5.

⁴³ *Ibid.*, 7.

⁴⁴ *Ibid.*, 11.

perceived doping for performance to be a successful strategy in the past are more likely to continue its use in the future, and to use the same strategy applied to military gene therapy.

Olympic antidoping policies exist as a subsystem of the Olympics as a whole. In turn, the Olympics are part of wider societies internationally. These systems exist within a context defined by Jamshid Gharajedaghi, who described complex, multi-minded sociocultural systems as being social organizations with three tiers. Accordingly, the lowest tier comprises the individual, actors, the second tier is the organization, and the third tier is the whole of society.⁴⁵ He noted these three levels are so enmeshed and connected that they seek “optimal solutions” dependent upon the nesting of interests of the tiered purposeful parts.⁴⁶ Further, he stated that these sociocultural systems have “common objectives,” and “collectively acceptable ways of pursuing them,” implying that each tier will follow the collective intent and purpose of the other aligning tiers.⁴⁷ Gharajedaghi’s three tiered system process means that systems act in concert, with each level considering the purpose of the others when taking action.

Within complex adaptive systems, designers have created tools for system success. Lawson described designers as purposefully designing objects for “specific purposes.”⁴⁸ Lawson described the Markus and Maver map of the design process, where the designer moves through analysis, synthesis, appraisal, and decision making in an iterative process from proposal, through schema design, to detailed design.⁴⁹ This iterative and looping process indicated a deliberate, structured process where the ultimate form of the end design or product was painstakingly shaped to deliver on the functions that are required of the client.⁵⁰ Lawson took his idea of design further

⁴⁵ Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*, 3rd ed. (Amsterdam: Morgan Kaufmann, 2011), 12.

⁴⁶ *Ibid.*, 12.

⁴⁷ *Ibid.*, 13.

⁴⁸ Bryan Lawson, *How Designers Think: The Design Process Demystified*, 4th ed. (Amsterdam: Architectural Press, 2006), 17.

⁴⁹ *Ibid.*, 37.

⁵⁰ *Ibid.*, 38.

by describing it as a “negotiation between problem and solution with each seen as a reflection of the other.”⁵¹ Lawson noted that clients commonly reiterate “existing solutions” when attempting to negotiate the design process.

Technology Adaptation

Understanding the likelihood of gene therapy or doping for military applications requires an examination of when and why technology diffuses into the military realm. One aspect of the international system that may influence technology adoption for military purposes is tension between nations. Helen Milner suggests two hypotheses. First, when power capabilities are less concentrated within the international system, technology is adopted and used more quickly.⁵² Second, a trend of decreasing systemic concentration could be the cause for faster technology adoption, and that an inverse trend of increasing concentration should indicate slower technology adoption.⁵³ These hypothesis suggest that the return of great power competition between the US and Russia will drive gene therapy adoption. Conversely, Milner suggests that as power becomes less concentrated in one nation, that the competition to advance and adopt new technology increases.⁵⁴

⁵¹ Bryan Lawson, 48.

⁵² Helen V. Milner, and Sondre Ulvund Solstad, “Technology Diffusion and the International System,” Princeton University (2018): 10, Accessed 29 November 2019, <https://scholar.princeton.edu/hvmilner/publications/technology-diffusion-and-international-system>.

⁵³ Ibid., 10.

⁵⁴ Milner and Solstad, 10.

Section III: Methodology

Introduction

The goal of this study was to conduct a qualitative assessment of the probability of military gene therapy or doping use in the US and Russia. Two case studies were developed to examine past predilection for state sponsorship of performance enhancing drug use in the Olympics by the US and Russia. The researcher contrasted these case studies using the structured, focused comparison approach. This methodology section describes the case studies, instrumentation, and elaborates on the research questions posed in the introduction.

Case Selection

The first case study centered on Russian propensity for the use of performance enhancing drugs in the Olympics, and on Russian government and military institutions for which evidence existed showing the development or use of gene editing technology. There was a strong historical precedence within the Soviet Union, and later Russia, for the use of performance enhancing drugs in sport. The second case study examined the use of performance enhancing drugs by US Olympic teams. Like many countries involved in the Olympics, there was some evidence of performance enhancing drug use on the part of US athletes. Additionally, the US has had institutions embedded within the military, and within legislation relating to the military, which supported the development of gene therapy.

Research for this study was conducted using a qualitative case study methodology. Using case studies created a concise and equal comparison between the US and Russia, and focused the collection of data. To do this, the study used the structured, focused comparison methodology as developed by George and Bennett.⁵⁵ The method used was structured because it asked the same

⁵⁵ Alexander L. George, and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge, MA: MIT Press, 2005), 67, Kindle Edition.

research questions of the US and Russia case studies. It was focused because it examined only the characteristics of Olympic doping that were pertinent for the research questions. This method created a systemic approach for comparison of findings for each case study.

Data collection for this study drew from primary and secondary sources investigating and reporting on performance enhancing drug use in elite sports, centered on investigations of doping in the Olympics by the US and Russia. Primary sources included documents from the International Olympic Committee, the World Anti-Doping Association, the Court of Arbitration for Sport, and the US Anti-Doping Association. Other primary sources included newspaper and magazine articles reporting on Olympic doping. Additional primary sources included US congressional legislation relating to gene therapy research, and US publications of current or future gene therapy research. Lastly, Russian legislative documents which had been translated were also included. This study then focused the data through the lens of one primary and five secondary research questions using the structured, focused comparison approach. This enabled the two case studies to allow for a qualitative comparison and analysis. The resulting differences in answers between case studies permitted an assessment of the study hypothesis.

Section IV: Russia Case Study

Russian state-sponsored Doping at the Olympics

Understanding state-sponsored doping begins with how Russia has structured the administration of sports. The Ministry of Sport (MofS) in the Russian Federation stated on its website that it is “a federal executive authority, which performs activities on formulation and implementation of State policy and legal and regulatory in the field of physical training and sports, as well as provision of public services (including prevention of doping in sports and fight against it).”⁵⁶ The Ministry of Sport also stated that it operates on its own, and through subordinate organizations, other federal authorities and executive branches, and non-governmental organizations. Importantly, the MofS also acknowledged that its operations are bound by Russia’s constitutional and national laws, presidential orders, and international treaties.⁵⁷ The Ministry of Sport acted through subordinate organizations, to include the Center of Sports Preparation of National Teams of Russia (CSP), and the Russian Anti-Doping Agency, which operated under the certification of the World Anti-Doping Association. It was the responsibility of these organizations to ensure athletes met the standards of the International Olympic Committee, and the World Anti-Doping Agency

Russia’s history with performance enhancing drugs began in earnest with the International Olympic Committee’s first drug testing policy which was adopted on May 9, 1967. The drug testing policy created new regulations regarding performance-enhancing substances. It also created an initial structure for demonstrating proof of doping.⁵⁸ The drug testing policy,

⁵⁶ “Ministry of Sport of the Russian Federation,” Russian Federation, accessed March 1, 2020, <https://www.minsport.gov.ru/en/>.

⁵⁷ Ibid.

⁵⁸ Wayne Wilson and Ed Derse, *Doping in Elite Sport: The Politics of Drugs in the Olympic Movement* (Champaign, IL: Human Kinetics, 2001), 68, accessed March 1, 2020, <http://catalog.hathitrust.org/api/volumes/oclc/44089413.html>.

though intended to preserve the integrity and prestige of the Olympic Games, was inherently flawed in implementation. Factors influencing the policy's implementation included the infancy of the medical commission program, and the reluctance of state officials to enforce rules seen as decreasing their competitive advantage. As a result of poor implementation, Russia did not have an athlete caught and disqualified for doping until the 2000 Olympic Games. Despite the lack of official sanctions by the International Olympic Committee, it was necessary to examine likely cases of doping before this point.

The 1972 Munich Summer Olympic games did not see any Russian athletes sanctioned for doping. However, this clean state is complicated by a 1972 Soviet document which revealed a secret Soviet program for anabolic steroid use among Soviet athletes.⁵⁹ This document, titled "Anabolic Steroids and Sport Capacity," detailed data from covert studies conducted during 1971-1972 on the performance improving capabilities of anabolic steroids. Importantly, these studies were conducted by the State Institute of Physical Culture in Moscow, a Soviet government organization. This document presents evidence that even though no Soviet competitors were found to be doping, there was likely a state-sponsored program in place. Of the 2,079 athletes tested during the 1972 Summer Games, only seven were found by the Results Management Authority to have violated an antidoping rule.⁶⁰ None of these athletes were Soviets. The Soviets would claim 285 medals during these games.⁶¹

⁵⁹ Andrew Nynka, "Ukrainian Scientist Details Secret Soviet Research Project on Steroids," *Ukrainian Weekly*, November 9, 2003, accessed January 9, 2020, <http://www.ukrweekly.com/old/archive/2003/450319.shtml>.

⁶⁰ International Olympic Committee, *The Fight Against Doping and Promotion of Athlete's Health*, 2, accessed January 7, 2020, <https://stillmed.olympic.org/media/DocumentLibrary/OlympicOrg/Factsheets-Reference-Documents/Medical/Fight-against-Doping/Factsheet-The-Fight-against-Doping-and-Promotion-of-Athletes-Health.pdf>.

⁶¹ Guardian, "Olympic Medal Winners: Every One Since 1896 as Open Data," *Guardian*, June 25, 2012, accessed January 9, 2020, <https://www.theguardian.com/sport/datablog/2012/jun/25/olympic-medal-winner-list-data>.

The 1976 Montreal Olympics would see the debut of testing for anabolic steroids, but again no Soviet athletes tested positive for anti-doping rule violations. The winter games of 1976 would also result in no doping violations for the Soviets.⁶² A dissection of the drug testing protocol revealed that of 275 administered drug tests, 215 tests searched only for illegal urine drugs. Thirty-four additional tests searched for urine and anabolic steroids tests, and eight tests were administered for steroids only.⁶³ At this time, Olympians in Soviet occupied East Germany and in the Soviet Union benefited from approximately “1,500 researchers, 1000 doctors, and 4,700 coaches.”⁶⁴ The USSR and East Germany achieved 215 medals in the Montreal Olympics, compared to 94 for the United States.⁶⁵

The 1980 Summer Olympics occurred during the height of the Cold War, and epitomized competition between the United States and the Soviet Union. Aleksandr Dityatin, a Soviet competitor, became the first athlete to earn eight medals in a single Olympic Games by medaling in every men’s gymnastics event.⁶⁶ The Soviet Union would go on to achieve 442 Olympic medals in the 1980 games, the most by any country.⁶⁷

Though Russia was not officially found to have athletes guilty of doping in the 1980 Moscow Summer Olympics, many Russian athletes were in fact doping with state-sponsored

⁶² International Olympic Committee, *The Fight Against Doping and Promotion of Athlete’s Health*, 2.; Michael Kremenik, Sho Onodera, Mitsushiro Nagao, Osamu Yuzuki, and Shozo Yonetani, “A Historical Timeline of Doping in the Olympics (Part 1 1896-1968),” *Kawasaki Journal of Medical Welfare* Vol 12, no. 1 (2006): 73, accessed March 1, 2020, http://www.kawasaki-m.ac.jp/soc/mw/journal/en/2006-e12-1/01_kremenik.pdf.

⁶³ Wilson, 159.

⁶⁴ Mark Johnson, “Doping Has Always Been Part of the Olympics. Of Course Russia Got Off the Hook,” *Washington Post*, July 29, 2016, accessed March 1, 2020, <https://www.washingtonpost.com/posteverything/wp/2016/07/29/doping-has-always-been-part-of-the-olympics-of-course-russia-got-off-the-hook/>.

⁶⁵ Ibid.

⁶⁶ “Moscow 1980,” International Olympic Committee, accessed March 1, 2020, <https://www.olympic.org/moscow-1980>.

⁶⁷ Guardian, “Olympic Medal Winners: Every One Since 1896 as Open Data,” *Guardian*, June 25, 2012, accessed March 1, 2020, <https://www.theguardian.com/sport/datablog/2012/jun/25/olympic-medal-winner-list-data>.

support. Important evidence for state-sponsorship of doping was supported by multiple factors. These include both 1972 Soviet documents indicating the propensity for state-sponsored doping programs, as well as the “testosterone loophole.”⁶⁸ This loophole referenced the consideration of testosterone as a natural substance by the International Olympic Committee at the time. The loophole promoted the popular use of testosterone as a performance enhancing drug of choice beginning in the 1970’s with no potential penalty.⁶⁹ Additionally, the new steroids tests carried out beginning with the Montreal Olympics in 1976 looked for non-endogenous substances, not substances considered to be naturally occurring within the body. Importantly, these tests could not detect testosterone use.⁷⁰

Allegations of doping in the Olympics were not new to Russia, and doping had been embedded in their sporting culture for decades. One of the key figures in bringing these allegations to light was Dr. Grigory Vorobiev, the chief medical doctor for the Russian track team for more than three decades. Dr. Vorobiev described in an interview how “winning at any cost” drove the creation of “precise measurements and timetables for the doping regimens” of track and field athletes in preparation for the 1984 Olympic games.⁷¹ For corroborating evidence, Vorobiev provided official Russian documents to the *New York Times*, dated November 24, 1983. These documents detailed a doping regimen which included an oral, and three injectable steroids. In the documents, Soviet sports officials directed the head of the nation’s track and field team to implement the doping plan.⁷² The documents also implicated the Soviet anti-doping lab in determining the timeline for detectability, and were signed by Dr. Sergei Portugalov. He would

⁶⁸ Kremenik, 74.

⁶⁹ *Ibid.*, 73.

⁷⁰ *Ibid.*

⁷¹ Rebecca R. Ruiz, “The Soviet Doping Plan: Document Reveals Illicit Approach to ’84 Olympics,” *New York Times*, August 13, 2016, accessed March 1, 2020, <https://www.nytimes.com/2016/08/14/sports/olympics/soviet-doping-plan-russia-rio-games.html>.

⁷² *Ibid.*

become a key figure in the coming decades to facilitating the distribution of performance enhancing drugs to athletes.⁷³

The Soviets boycotted the 1984 Los Angeles Summer Olympic Games, preventing Soviet athletes from citation for anti-doping rule violations.⁷⁴ Soviet officials had been prepared, as indicated in uncovered 1983 official documents, to conduct both oral and injectable administration of multiple anabolic steroids to guarantee the performance of its top athletes.⁷⁵ The confidential documents indicated a meeting had taken place on Nov 24, 1983. The meeting approved “individual profiles of special pharmacological preparation” for athletes.⁷⁶ Although exogenous testosterone had been banned by the International Olympic Committee in 1982, and testing developed for detection, many athletes were switching to Human Growth Hormone as there was no testing available for that substance.⁷⁷

The 1988 Olympic Games in Calgary and Seoul would see 492 winter, and 1,598 summer games doping tests. The international Olympics Committee found one winter, and ten summer games anti-doping rule violations. Two of these violations would come from Hungarian weightlifters, which were found to be using diuretics. The Soviets were better prepared for the Seoul Games. A 1989 edition of the Soviet magazine *Zmen* noted that the ship “Michail Shalokhov” had sailed off the coast of Korea to provide Soviet Olympians with pre-game testing from their onboard \$2.5 million laboratory.⁷⁸ A 1989 Los Angeles Times article claimed that

⁷³ Ibid.

⁷⁴ Dusko Doder, “Soviets Withdraw From Los Angeles Olympics,” *Washington Post*, May 9, 1984, accessed March 1, 2020, <https://www.washingtonpost.com/archive/politics/1984/05/09/soviets-withdraw-from-los-angeles-olympics/027363e6-4d89-4dd9-b0d7-89a05a567f11/>.

⁷⁵ Rebecca R. Ruiz, “The Soviet Doping Plan: Document Reveals Illicit Approach to ’84 Olympics,” *New York Times*, August 13, 2016, accessed March 1, 2020, <https://www.nytimes.com/2016/08/14/sports/olympics/soviet-doping-plan-russia-rio-games.html>.

⁷⁶ Ibid.

⁷⁷ Kremenik, 74-75.

⁷⁸ Thomas Mitchell Hunt, “Drug Games: The International Politics of Doping and the Olympic Movement, 1960-2007,” (PhD diss., University of Texas at Austin), 119.

Russian athletes would be removed from competition if these tests indicated an athlete would test positive.⁷⁹

The Atlanta Olympic Games in 1996 further illuminated the linkage between state-sponsorship and Russian Olympic doping. The games also illustrated how Russia similarly treated elite athletes and military performance enhancement, with the state as a controlling nexus. In 1996, Prince Alexandre de Merode, the International Olympic Committee medical chairman, revealed that a previously unknown substance known as Bromantane was found in at least twenty samples taken from Russian athletes over the past two years.⁸⁰ Russian Olympic Committee President Vitaly Smirnov confirmed in an interview that Bromantane had been developed by the Russian military, and recommended for use in athletes by the researchers who created it.⁸¹

Further evidence concerning the use of Bromantane surfaced in the International Olympic Committee Court of Arbitration for Sport in their initial decisions to disqualify two Russian medalists. These included bronze medalist swimmer Andrei Korneev and bronze medalist wrestler Zakhar Gouliev, both from the Atlanta Games.⁸² In the hearing which decided the athlete's disqualification, it was noted that Bromantane had been used by athletes in the 1988 and 1992 games, in addition to the 1996 games. The substance had gone undetected due to its development in Russia. Bromantane use both cemented the link between military and Olympic drug use, and bridged the gap between Soviet and Russian Federation regimes.

⁷⁹ Associated Press, "Soviet Doping Widespread, Report Says: Magazine Claims Athletes had Secret Lab Near Seoul," *Los Angeles Times*, March 24, 1989, accessed March 1, 2020, <https://www.latimes.com/archives/la-xpm-1989-03-24-sp-460-story.html>.

⁸⁰ Stephen Wilson, "IOC Official Says Bromantan Produced by Russian Army," *AP News*, August 1, 1996, accessed March 1, 2020, <https://apnews.com/179a0b2d830098eacd6e10dbcb8eda5d>.

⁸¹ *Ibid.*

⁸² Court of Arbitration for Sport, "Arbitration No 003-4 Final Award in the Arbitration Between Andrei Korneev and International Olympic Committee and in the Arbitration Between Zakhar Gouliev and International Olympic Committee," August 4, 1996, 20, accessed March 1, 2020, https://www.doping.nl/media/kb/5578/CAS%20OG_1996_03%20%26%2004%20Andrei%20Korneev%20vs%20IOC%20-%20Zakhar%20Gouliev%20vs%20IOC%20%28OC%29.pdf.

Dr. Vitaly Semenov, head of the antidoping center in Moscow, admitted that he had discovered Bromantane five years previously. Semeov admitted testing Bromantane use in athletes in comparison with another known but banned substance named Mesocarb. Semenov's work led the Institute of Pharmacology of the Russian Federations, and the Russian Olympic Committee to recommend it be administered to Olympic athletes for use before and during the games.⁸³ Though evidence of state-sponsored Russian doping, the disqualification ruling was overturned by an independent court due to Bromantane's absence on the banned substances list.⁸⁴

Russian Olympic performance enhancing drug use continued during Olympic games in the twenty-first century. The 2000 Sydney Olympics ushered in an era of positive doping tests as testing technology improved. The first of these positive tests included Russian track athlete Svetlana Pospelova, who tested positive for Stanozolol, an anabolic steroid. Despite past evidence of Russian state-sponsored doping, no comprehensive link to Russian Olympic officials was investigated at the time.⁸⁵ Larger doping sample sizes would not be seen until subsequent Olympic games.

The 2004 Athens Games began a small resurgence of doping in Russian athletics and weightlifting when five Russian athletes were found to have used anabolic steroids.⁸⁶ One of these, Oleg Perepetchenov, was a bronze medalist in men's weightlifting. Another, Svetlana

⁸³ Court of Arbitration for Sport, "Arbitration No 003-4 Final Award in the Arbitration Between Andrei Korneev and International Olympic Committee and in the Arbitration Between Zakhar Gouliev and International Olympic Committee," 13.

⁸⁴ Los Angeles Times, "Arbitrators Reinstate Russians and British Swimmer May Sue," *Los Angeles Times*, August 5, 1996, accessed March 1, 2020, <https://www.latimes.com/archives/la-xpm-1996-08-05-ss-31603-story.html>.

⁸⁵ Associated Press, "Australia: Sydney Olympics: Drugs," *AP News*, September 30, 2000, accessed March 1, 2020, <http://www.aparchive.com/metadata/youtube/fed85f1bd28a756fb0c7db326b74275c>.

⁸⁶ International Olympic Committee, "Antidoping Rules Procedures and Violations at the Athens 2004 Olympic Games," n.d., accessed March 1, 2020, http://www.olympic.org/Documents/Reports/EN/en_report_921.pdf.

Krivelyova, was a bronze medalist in the women's shot put.⁸⁷ The important linkage between these two athletes lies in the fact that their initial sample tested negative for performance enhancing drugs. This link is the first evidence of Russia's adaptation to doping controls. Both athlete's samples tested positive during a reexamination of samples in 2012.⁸⁸

Though "Zero Tolerance for Doping" was the 2008 Beijing Olympic Games slogan, many experts doubted the veracity of testing.⁸⁹ For the drug Erythropoietin in particular, dozens of "copycat" blood-doping drug variants were in circulation around the world, and experts doubted that World Anti-doping Association labs would catch doping athletes.⁹⁰ There were also allegations by German broadcasters that Chinese doctors offered gene doping or stem-cell treatments to athletes.⁹¹ The International Olympic Committee would go on to conduct 4,800 drug tests during the games.⁹² Ultimately, only seven athletes were found in violation of anti-doping rules during the 2008 games, though sixty-five would be discovered during later retesting.⁹³

⁸⁷ International Olympic Committee, "IOC Disqualifies Four Medalists from Athens 2004 Following Further Analysis of Stored Samples," *International Olympic Committee*, 05 December, 2012, accessed March 1, 2020, <https://www.olympic.org/news/ioc-disqualifies-four-medallists-from-athens-2004-following-further-analysis-of-stored-samples>.

⁸⁸ International Olympic Committee, *IOC Disqualifies Russian Weightlifter From Athens 2004 Following Further Analysis of Stored Samples*, February 12, 2013, accessed March 1, 2020, <https://www.olympic.org/news/ioc-disqualifies-russian-weightlifter-from-athens-2004-following-further-analysis-of-stored-samples>.

⁸⁹ DW Staff, "Beijing Faces Big Challenge in Keeping Olympics Drug-Free," *DW*, August 3, 2008, accessed March 1, 2020, <https://www.dw.com/en/beijing-faces-big-challenge-in-keeping-olympics-drug-free/a-3530852>.

⁹⁰ Matt McGrath, "Concerns Over Olympic Drug Test," *BBC*, July 21, 2008, accessed March 1, 2020, <http://news.bbc.co.uk/2/hi/science/nature/7516484.stm>.

⁹¹ DW Staff, "Beijing Faces Big Challenge in Keeping Olympics Drug-Free."

⁹² International Olympic Committee, *IOC Reanalysis Programme, Beijing 2008 and London 2012*, January 25, 2017, 2, accessed February 6, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/IOC-reanalysis-programme-25-January-2017-eng.pdf>.

⁹³ International Olympic Committee, *Anti-doping Rule Violations During or After the Games*, July 23, 2019, accessed March 1, 2020, <https://www.olympic.org/-/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/2019/Antidoping-factsheet-retests-23-07-2019.pdf>.

Russian Doping during the 2008 Beijing Games included athletes that had been banned previously, and then after competition in retesting years later. Seven Russian female track and field athletes, to include several champions, were banned prior to the start of the 2008 games for samples which did not have matching DNA.⁹⁴ Later, the International Olympic Committee would retest 1,053 samples as part of a targeted reanalysis program.⁹⁵ In 2016, seventeen additional Russian athletes were caught by this program with improved testing technology.⁹⁶ These included five silver and four bronze medalists in their respective sports.⁹⁷

The 2012 London Games created a similar trend for Russian athletes with low in-game doping positives. Only one Russian athlete, silver medalist Darya Pischalnikova, tested positive during the 2012 games.⁹⁸ Later reporting would reveal that Pischalnikova attempted to become a cooperative whistleblower concerning systemic Russian doping by emailing the World Anti-doping Association in December 2012.⁹⁹ The World Anti-Doping Association passed the information to the International Association of Athletics Federation, who then passed the information back to the Russian Anti-doping Agency.¹⁰⁰ The Russian agency would subsequently ban her. Pischalnikova's evidence would eventually be included into two World Anti-doping Associate reports by Richard McLaren as part of later investigations.¹⁰¹

⁹⁴ BBC, "Seven Russians Handed Doping Bans," *BBC*, October 20, 2008, accessed March 1, 2020, <http://news.bbc.co.uk/sport2/hi/athletics/7679893.stm>.

⁹⁵ International Olympic Committee, *IOC reanalysis Programme, Beijing 2008 and London 2012*, 1.

⁹⁶ *Ibid.*, 2.

⁹⁷ *Ibid.*, 5-6.

⁹⁸ BBC, "Olympian Darya Pishchalnikova Suspended Over Failed Drug Test," *BBC*, December 8, 2012, accessed February 7, 2020, <https://www.bbc.com/sport/athletics/20555050>.

⁹⁹ Rebecca R. Ruiz, Juliet Macur, and Ian Austen, "Even with Confession of Cheating, World's Doping Watchdog Did Nothing," *New York Times*, June 15, 2015, accessed February 10, 2020, <https://www.nytimes.com/2016/06/16/sports/olympics/world-anti-doping-agency-russia-cheating.html>.

¹⁰⁰ *Ibid.*

¹⁰¹ Andy Brown, "Vitaly Mutko Alleged to have Silenced Russian Doping Whistleblower," *Sports Integrity Initiative*, February 20, 2017, accessed February 16, 2020, <https://www.sportsintegrityinitiative.com/vitaly-mutko-alleged-silenced-russian-doping-whistleblower/>.

The International Olympic Committee sanctioned many Russian athletes during their retesting program, prompted by doping allegations. The program selected 492 of the 5,000 drug testing samples stored from the 2012 games for retesting, and 37 additional sanctions were issued as of January 2017. Among these, eleven Russian athletes were found to be doping. Two athletes were gold medalists, and four were silver medalists.¹⁰²

Much of the modern evidence of Russian Federation doping within the Olympics exists primarily due to the German Broadcaster ARD. On December 3, 2014, ARD began broadcasting a documentary program, “Top-Secret Doping: How Russia makes its Winners.”¹⁰³ The program alleged Russian doping on a massive scale.¹⁰⁴ It also prompted the World Anti-doping Association to commission an independent investigation to report on the allegations.

Richard McLaren conducted the investigation and compiled the report, which was divided into two parts. He delivered the first in July 2016, and the second in December of the same year. The investigation prompted many of the additional reanalysis disqualifications for Russian athletes who had participated in the 2012 London and 2014 Sochi Olympic games. The evidence of wide spread Russian doping would prompt backlash from the international community against Russian behavior. Additionally, Russia would be banned from direct participation in the 2016 Rio Olympics.

The McLaren investigation uncovered the modern Russian process for Olympic doping, which demonstrated an adaptation of the doping control system. Though doping control systems were designed to safeguard against cheating, Russian state officials redesigned the system’s

¹⁰² International Olympic Committee, *IOC reanalysis Programme, Beijing 2008 and London 2012*, 1-3.

¹⁰³ International Olympic Committee, *IOC Disciplinary Commission’s Report to the IOC Executive Board*, Lausanne: CH, December 2, 2017, 9, accessed March 1, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/IOC-DC-Schmid/IOC-Disciplinary-Commission-Schmid-Report.pdf>.

¹⁰⁴ *Ibid.*, 1.

internal functions. The redesigned system increased Russian competitive capabilities, while promoting the Russian narrative on the international stage.

The Russian state coordinated at many levels to enable doping. Linkages downward within state offices demonstrated the potential for state involvement at the highest level. President Vladimir Putin appointed the Deputy Minister of Sport, Yuri Nagornykh, in 2010.¹⁰⁵ Previously, President Medvedev had appointed the Russian Minister of Sport, Vitaly Mutko, in 2008. These two ministers, along with the Deputy Director of the Center of Sports Preparation of National Teams of Russia, Irina Rodionova, were implicated in McLaren's investigation. The three together were posited as architects of the Russians doping plan by McLaren, with Deputy Minister Nagornykh as the executor.¹⁰⁶ Minister Mutko would be promoted to "Deputy Prime Minister responsible for sport, tourism and youth policy" despite his complicity in Olympic doping.¹⁰⁷

Part one of McLaren's report to the World Anti-Doping Association President December 9, 2016, argued three key findings.¹⁰⁸ First, McLaren found that the Moscow laboratory functioned to protect Russian athletes from failing anti-doping tests. McLaren described this as the "Disappearing Positive Methodology."¹⁰⁹ Second, McLaren found that to avoid positive results at the Sochi laboratory, Russian officials had developed a method to swap samples. Finally, he concluded that the Russian Ministry of Sport was the architect and executor of the alteration of athlete testing results and samples. Importantly, he also concluded that the Ministry

¹⁰⁵ Richard H. McLaren, "The Independent Person Report: WADA Investigation of Sochi Allegations," *World Anti-Doping Association*, July 16, 2016, 63, accessed March 1, 2020, <https://www.wada-ama.org/en/resources/doping-control-process/mclaren-independent-investigation-report-part-i>.

¹⁰⁶ *Ibid.*, 63.

¹⁰⁷ Shaun Walker, "Vitaly Mutko Promoted to Newly Created Russian Deputy Prime Minister Role," *Guardian*, October 19, 2016, accessed November 28, 2019, <https://www.theguardian.com/football/2016/oct/19/vitaly-mutko-promoted-russia-deputy-prime-minister-sport-vladimir-putin>.

¹⁰⁸ Richard H. McLaren, "The Independent Person Report: WADA Investigation of Sochi Allegations," 1.

¹⁰⁹ *Ibid.*, 10.

of Sport was aided by the Russian Federal Security Service, the Center of Sports Preparation of National Teams of Russia, and both the Moscow and Sochi laboratories.

McLaren argued in his report that the Moscow Laboratory manipulated the results of Russian athlete urine samples, which was conducted under the control of state oversight.¹¹⁰ This corruption on the part of the Moscow laboratory was argued to be “failsafe” against procedures in place, allowing Russian officials to “promote and permit” the performance enhancement of Russian athletes through doping.¹¹¹ The report stated that the laboratory, at the direction of the Ministry of Sport, used the “Disappearing Positive Methodology”.¹¹² Under this methodology, the laboratory would first report the athlete’s name for any positive test results to the Ministry of Sport, Deputy Minister Nagornykh. Subsequently, the lab received either a “SAVE, or “QUARANTINE” order. If ordered to “SAVE”, the lab manipulated the result in their laboratory Information Management System to indicate a negative result, in turn triggering a negative result to the WADA Anti-Doping Management System (ADAMS).¹¹³ This process meant that Russian officials were coordinating at many levels to directly support the use of performance enhancing drugs by athletes for international competition. The “Disappearing Positive Methodology” worked well for manipulating doping results that occurred within the Russian Federation. However, a different tactic was needed for international competitions such as the 2014 Sochi Olympics, which would be monitored by outside partners.

The Russian process for Olympic doping, as uncovered by the McLaren investigation and the Compliance Review Committee, demonstrated an adaptation of the doping control system. Though doping control systems were designed to safeguard against cheating, Russian state

¹¹⁰ McLaren, 6.

¹¹¹ McLaren, 7.

¹¹² Ibid., 10.

¹¹³ Ibid., 11.

officials redesigned the system's internal functions. The redesigned system increased Russian competitive capabilities, while promoting the Russian narrative on the international stage.

Russian officials performed an extensive transformation of doping control methods into doping enablers. A systems analysis began with the Deputy Minister of Sport, Minister Nagornyykh. He acted as chief executor of a three-part doping plan. This plan was put into place after a disappointing Russian performance in the 2010 Vancouver Olympic Games. It was approved by Minister of Sport Mutko, and Deputy Director Irini Rodinova of the Center of Sports Preparation of National Teams of Russia. Dr. Rodchenkov, the head of the Moscow anti-doping lab, developed the doping plan best able to increase athletic performance.

The McLaren investigation prompted the International Olympic Committee to suspend the Russian Anti-Doping Agency, and to levy requirements upon the agency prior to recertification. Though WADA's Executive Committee would reinstate the Russian Anti-Doping Agency as "Code-Compliant" in September 2018, the Russian agency needed to provide all requested Moscow Laboratory Information Management System data and stored urine samples for analysis.¹¹⁴ Russia had the opportunity to address Dr. Grigory Rodchenkov's whistleblower allegations concerning systemic or state-sponsored doping.¹¹⁵ Compliance with the agency could have completed the doping saga initiated by the ARD December 2014 investigation.

The anti-doping agency's Intelligence and Investigations Department found that the Russia Anti-Doping Agency failed to provide complete data, and that the agency falsified much of the data provided. The requested Laboratory Information Management System data was provided to WADA in January 2019, and 2,262 urine samples in April 2019.¹¹⁶ However, WADA found that the data was incomplete based on a previous 2015 version provided by a

¹¹⁴ World Anti-Doping Association Compliance Review Committee, *CRC Recommendation in Relation to RUSADA*, Lausanne: CH, November 21, 2019, 1, accessed March 1, 2020, https://www.wada-ama.org/sites/default/files/20191209_crc_recommendation_final.pdf.

¹¹⁵ Ibid.

¹¹⁶ Ibid.

whistleblower. Hundreds of adverse analytical findings had been deleted from the database, and much of the foundational data had been modified.¹¹⁷ Much of the evidence within the data had been deleted or edited after Dr Rodchenkov departed the Laboratory, and also after McLaren's investigation. WADA found that deletions had been made as recently as December 2018 and January 2019, immediately prior to data delivery. Significant effort had been spent to ensure system files had been backdated, and the system execution commands used to backdate the false data had been deleted by someone with system administrator privileges¹¹⁸.

The World Anti-Doping Association addressed data discrepancies with the Russian Ministry of Sport in September 2019. The new Minister of Sport, Pavel Kolobkov, referred to "New Data" to explain the discrepancies, which had not been previously made available.¹¹⁹ The World Anti-Doping Association requested this data on 15 October 2019, and Minister Kolobkov provided a copy on 23 October 2019. The WADA "independent experts" found that evidence within the "New Data" had also been altered or deleted to hide the extensive removal of adverse analytical findings, along with other indications of complicity in a doping scheme.¹²⁰ Forum messages directing blame toward Dr Rodchenkov had also been fabricated.¹²¹ The experts found that this occurred between 18 and 22 October 2019, after requests for the data had been made by WADA, but before it was provided.¹²² The WADA expert's findings meant that evidence, including presumptive findings against Russian athletes, had been removed long after Dr. Rodchenkov was gone. The findings also implied that this evidence had been removed under the authority of the Russian government.

¹¹⁷ *CRC Recommendation in Relation to RUSADA*, 1.

¹¹⁸ *CRC Recommendation in Relation to RUSADA*, 7.

¹¹⁹ *Ibid.*, 2.

¹²⁰ *Ibid.*, 17-18.

¹²¹ *Ibid.*

¹²² *Ibid.*, 2.

Importantly, the Moscow Laboratory was under the purview of the Ministry of Sport and the Russian Investigative Committee for the entirety of the time the contamination of the data was executed. In every instance of alteration of laboratory databases, which were extensive, the Russian Investigative Committee gave explanations for why the data appeared manipulated but was claimed to be authentic. The WADA investigation examined these claims by the committee, and rejected all of them.¹²³ The Russian Investigative Committee had professed the laboratory as a “crime scene,” and had been aware of the need to preserve evidence.¹²⁴ In fact, Minister Kolobkov originally claimed he couldn’t provide the data in 2017 and 2018 because it was “sealed evidence.”¹²⁵

The fallout from Russian doping investigations prompted by the ARD documentary in 2014 ultimately resulted in the reanalysis of Russian athletes for doping violations dating from the Beijing Olympics in 2008 through the 2018 Olympics.¹²⁶ Multiple investigations into Russian doping were conducted. Investigations included the Pound Commission in 2015, the McLaren Reports in 2016, whistleblower information in 2017, and the World Antidoping Association Intelligence and Investigation activities in 2019.¹²⁷ Retesting would go as far back as the Vancouver games from 2010.

The International Olympic Committee announced in December 2016 that it would retest samples from the Vancouver Olympic Games of 2010 as a result of McLaren’s report.¹²⁸

¹²³ *Ibid.*, 17.

¹²⁴ *CRC Recommendation in Relation to RUSADA*, 21.

¹²⁵ *Ibid.*

¹²⁶ International Olympic Committee. *IOC Disciplinary Commission’s Report to the IOC Executive Board*, Lausanne: CH, December 2, 2017, 9.

¹²⁷ World Anti-Doping Agency, “Chronology of Russian Doping Crisis,” February 3, 2020, 1, accessed February 10, 2020, https://www.wada-ama.org/sites/default/files/chronology_russian_doping_crisis.pdf.

¹²⁸ Christopher Furlong, “IOC Starts Disciplinary Procedures Against 28 Russian Athletes from Sochi 2014,” *International Olympic Committee*, December 23, 2016, accessed March 1, 2020, <https://www.olympic.org/news/ioc-starts-disciplinary-procedures-against-28-russian-athletes-from-sochi-2014>.

Originally, three Russian biathlon athletes had been caught doping prior to the Vancouver Games using the blood-booster Erythropoietin, and were not allowed to compete.¹²⁹ An additional Polish biathlon athlete's sample tested positive for using the same substance during the games.¹³⁰ After the International Olympic Committee retested over 1200 samples using improved technologies, one additional athlete from Slovenia was found to have used a growth hormone releasing peptide.¹³¹ None among the entire roster of 170 Russian athletes had a positive doping result.¹³² The Oswald Disciplinary Commission disqualified the Slovenian athlete, and revoked her results.¹³³

By March 2016, the International Olympic Committee reanalysis program revealed greater than 100 Russian athlete's had adverse analytical findings.¹³⁴ Retesting of the Sochi Games continued to find Russian athletes guilty of doping in high numbers. By 2017, the reanalysis of stored urine samples had resulted in dozens of sanctions against Russian athletes from the Sochi Games.

As a result of extensive systemic doping within the Russian Federation, the World Anti-Doping Association declared the Russian Anti-Doping Agency "non-compliant for a period of

¹²⁹ Gennady Fyodorov, "Update 1-Doping-Three Russian biathletes Banned for Two Years," *Reuters*, accessed March 1, 2020, <https://www.reuters.com/article/doping-biathlon-russia/update-1-doping-three-russian-biathletes-banned-for-two-years-idUSLC53393320090812>.

¹³⁰ IOC Disciplinary Commission, *Decision Regarding Kornelia Marek*, April 29, 2010, 3, accessed February 5, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/2010/2010-05-29-PUBLIC-IOC-Disciplinary-Commission-decision-regarding-%20Kornelia-Marek.pdf>.

¹³¹ BBC, "Vancouver 2010 Winter Olympics: Only Athlete to Test Positive Named," *BBC*, October 26, 2017, accessed February 5, 2020, <https://www.bbc.com/sport/winter-olympics/41767281>.

¹³² *Ibid.*

¹³³ IOC Disciplinary Commission, *Decision of the IOC Disciplinary Commission in the Proceedings against Teja Gregorin*, December 18, 2017, 7, accessed February 8, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/2017/VRT-001-Decision-of-the-Disciplinary-Commission-Teja-GREGORIN.pdf>.

¹³⁴ International Olympic Committee, "Decision of the IOC Disciplinary Commission in the Proceedings against Alexander KAS'YANOV," December 20, 2017.

four years.” The associated declared multiple severe consequences for a four-year period as well. These included the banning of Russian government officials from attending Olympic Games. Russia was also banned from hosting any major sporting events which the World Anti-Doping Association monitored, and from flying their flag at any event. Russian athletes would also need to pass multiple hurdles. These included proof of innocence from incrimination by manipulated drug test data or McLaren report findings. Athletes and their coaches would be required to demonstrate evidence of adequate drug testing.¹³⁵

State of Gene Editing Legislation and the Influence of Special Interest Groups in Russia

Russia has sought, like the United States and China, to compete in gene editing technology in humans. Its stance has trended towards preserving Russian genetic integrity, preventing the inheritance of genetic disease, and genetic testing for societal control. Russia has also been influenced by international interest groups who caution on human genetic modification. To date, Russia has passed no direct laws contravening the study of gene editing, and its current stance on gene editing originated in reproductive health. Consequently, Russia has taken an outwardly cautious but progressive stance on research.

Russia is not a signatory to the Oviedo Convention.¹³⁶ The Oviedo convention created the first and only international binding agreement to protect human rights regarding biomedical technology.¹³⁷ Since 1997, the convention had prohibited several genetic related activities. Some of the prohibited biomedical activities included discrimination based on genetic heritage, genetic

¹³⁵ World Anti-Doping Agency, “Chronology of Russian Doping Crisis,” February 3, 2020, 2, accessed February 10, 2020, https://www.wada-ama.org/sites/default/files/chronology_russian_doping_crisis.pdf.

¹³⁶ Rumiana Yotova, “The Regulation of Genome Editing and Human Reproduction Under International Law, EU Law and Comparative Law,” *Nuffield Council of on Bioethics*, June 2017, 4, accessed March 1, 2020, <https://www.nuffieldbioethics.org/wp-content/uploads/Report-regulation-GEHR-for-web.pdf>.

¹³⁷ “Oviedo Convention and its Protocols”, Council of Europe, accessed March 1, 2020, <https://www.coe.int/en/web/bioethics/oviedo-convention>.

modification for purposes other than diagnosis or treatment, and any inheritable modification of the genome.¹³⁸ Russia, as a consequence of not being a signatory, has relied upon its Civil Code to inform its treatment of genetic technology.

The 1996 Russian Federal Law No. 86, passed in 1996 and amended in 2016, categorized genetic engineering from the Russian perspective as a biotechnology, and defined gene therapy as a means of genetic mutation identification in somatic cells.¹³⁹ It defined genetic engineering as “the methods and technologies, including technologies for achieving recombinant RNA and DNA, for isolating genes from the organism, manipulating genes and introducing them in other organisms.”¹⁴⁰ In 2003, the Russian Federation Ministry of Healthcare also created rules for infertility treatments and reproductive technology.¹⁴¹ In 2014, Russia altered its Civil Code to prevent patent grants concerning modification of the human genetic code, or germline.¹⁴² The Kremlin may have intended this change to disincentivize investment in genetic engineering research, or to prevent any patent holder from exercising control over a perceived cultural and societal ownership of the human genome.

The Russian Ministry of Health’s Order No. 107 most closely impacted the potential for future genomic editing. Though the order did not specifically mention genetic editing, it set the stage for the proliferation of genetic testing from a reproductive perspective. The order stated that women with a family history of chromosome related or congenital diseases should be genetically and chromosomally tested. The order also required women with female-linked disease histories,

¹³⁸ Council of Europe, *Additional Protocol to the Convention on Human Rights and Biomedicine*, Strasbourg, November 11, 2008, accessed April 1, 2020, <https://www.coe.int/en/web/conventions/full-list/-/conventions/rms/0900001680084824>.

¹³⁹ Yotova, 49.

¹⁴⁰ Ibid.

¹⁴¹ Konstantin Svitnev, “Legal Regulation of Assistance Reproduction Treatment in Russia,” *Reproductive BioMedicine Online* 20 (2010): 892, accessed February 5, 2020, [https://www.rbmojournal.com/article/S1472-6483\(10\)00174-4/pdf](https://www.rbmojournal.com/article/S1472-6483(10)00174-4/pdf).

¹⁴² Yotova, 49.

to include muscular dystrophy, to have “preimplantation genetic diagnostics” performed. These diagnostics were recommended, but not required for high risk children. The order indicated egg donorship as a recommended action in the event of genetic disease.¹⁴³

The Russian Health Ministry issued a statement they will support the World Health Organization’s stance against editing of the human germline, which would create inheritable changes.¹⁴⁴ Any medical research in gene therapy in Russia would also need the Russian Health Ministry’s approval. This requirement strongly involved the Russian government in any gene editing process.

Some scientists in Russia have sought to move beyond the cautious stance evidenced by the World Health Organization. Russian molecular biologist Denis Rebrikov stated in 2019 that he intended to produce gene edited embryos, and implant them in women.¹⁴⁵ Rebrikov initially stated that he would target the same gene worked on by Chinese scientist He Jianku between 2017 and 2018.¹⁴⁶ The Russian health ministry, in response to news coverage of Rebrikov, stated that Russia would follow the World Health Organization’s position, which means not altering the human germline in clinical studies until complications were fully considered.¹⁴⁷

The Russian position may have been altered toward research progression in reaction to an editorial published in the *Nature* academic Journal. In this editorial, *Nature* called for scientists to work with Rebrikov to “identify and discuss the risks.”¹⁴⁸ In *Nature*’s editorial, the purpose of

¹⁴³ Yotova, 49.

¹⁴⁴ Olga Dobrovidova, “Calling Embryo Editing ‘Premature,’ Russian Authorities Seek to Ease Fears of a Scientist Going Rogue,” *State News*, October 16, 2019, accessed January 23, 2020, <https://www.statnews.com/2019/10/16/russia-health-ministry-calls-human-embryo-editing-premature/>.

¹⁴⁵ U.S. News Staff, “In Russia, a New Assertion Over Gene-Editing,” *U.S. News*, June 13, 2019, accessed January 23, 2020, <https://www.usnews.com/news/best-countries/articles/2019-06-13/a-russian-scientist-says-he-plans-to-produce-gene-edited-babies>.

¹⁴⁶ Ibid.

¹⁴⁷ Olga Dobrovidova, “Calling Embryo Editing ‘Premature,’ Russian Authorities Seek to Ease Fears of a Scientist Going Rogue”.

¹⁴⁸ Editorial, “Act now on CRISPR Babies,” *Nature*, June 11, 2019, accessed February 1, 2020, <https://www.nature.com/articles/d41586-019-01786-3>.

the discussion was keeping pace with the ability of research to advance gene editing technology. After the *Nature* editorial, Russia convened its preeminent geneticists at a “secret meeting” in Moscow to discuss Rebrikov’s plan to research and use gene editing CRISPR technology. Guests included Russian President Putin’s daughter, Maria Vorontsova, who is a Russian endocrinologist with strong policy impact on the subject of bioethics.¹⁴⁹ Vorontsova’s stance was that “progress can’t be stopped,” and she recommended that CRISPR be “confined to state-run facilities to maximize oversight.”¹⁵⁰

One of the primary special interest groups within Russia that affected Russian public opinion is the Russian Orthodox Church. The church published a statement that acknowledged the potential of gene editing to prevent inherent disease, and argued for prohibition of the technology if it endangered the human embryo.¹⁵¹ This policy left open the practice of gene editing of existing humans via somatic cell gene therapy for disease treatment or performance enhancement. Importantly, it also did not move against the editing of the germline in human embryos unless harm is involved.

Russia has considered or implemented significant steps toward using genetic technology on its citizenry. In a decree issued by President Putin in March 2019, he announced the implementation of genetic certification of the Russian Population.¹⁵² The decree also prioritized analysis of the capability of foreign militaries to develop biological weapons, including genetic engineering and “synthetic biology technologies.”¹⁵³

¹⁴⁹ Stepan Kravchenko, “Future of Genetically Modified Babies May Lie in Putin’s Hands,” *Bloomberg*, September 28, 2019, accessed March 1, 2020, <https://www.bloomberg.com/news/articles/2019-09-29/future-of-genetically-modified-babies-may-lie-in-putin-s-hands>.

¹⁵⁰ *Ibid.*

¹⁵¹ *Ibid.*

¹⁵² Vladimir Putin, “Decree of the President of the Russian Federation No. 97,” *President of Russia*, March 11, 2019, accessed February 1, 2020, <http://www.kremlin.ru/acts/bank/44066/page/1>.

¹⁵³ *Ibid.*

In the military realm, Russia may also build a genetic database of soldiers which could be used as a precursor to gene editing. The head of Russia's Academy of Sciences, Alexander Sergeyev, announced in 2019 that Russia was considering a "genetic passport" for their soldiers.¹⁵⁴ The intent was to assign soldiers based on genetic predilection towards certain tasks.¹⁵⁵ "Resistance to stress, the ability to perform physical and mental operations under conditions of this stress" were all objectives.¹⁵⁶ Sergeyev also discussed the active development of regenerative medicine for "organ printing at the cellular level" by Russia's Military Medical Academy.¹⁵⁷ As of Sergeyev's interview with TASS in June 2019, thirteen members of the Russian Academy of Sciences were working at the Military Medical Academy on the military "genetic passport."¹⁵⁸ This research possibly advanced existing Russian genetic engineering technology already being developed since the 1970's.¹⁵⁹

Ultimately, President Vladimir Putin has positioned himself as the ultimate authority on the decision to use CRISPR, according to Russian officials.¹⁶⁰ Indications in legislation passed by Putin are that has at least prepared the stage for genetic modification by virtue of a massive

¹⁵⁴ Zak Doffman, "Russia Will Genetically Test Soldiers To Identify The Best Fighters and Thinkers," *Forbes*, June 8, 2019, accessed November 29, 2019, <https://www.forbes.com/sites/zakdoffman/2019/06/08/russias-new-genetic-military-passports-will-sort-the-fighters-from-the-thinkers/#7bfb48c62a6e>.

¹⁵⁵ *Ibid.*

¹⁵⁶ Andrei Reznichenko, "President of the Russian Academy of Sciences: Science Cannot be Isolated," *TASS*, June 6, 2019, accessed March 1, 2020, <https://nauka.tass.ru/interviews/6513972>.

¹⁵⁷ *Ibid.*

¹⁵⁸ *Ibid.*

¹⁵⁹ Michael J. Ainscough, "Next Generation Bioweapons: Genetic Engineering and BW," *US Air Force Counterproliferation Center Future Warfare Series No. 14* (Maxwell Air Force Base, Alabama): 277, accessed March 1, 2020, <https://media.defense.gov/2019/Apr/11/2002115480/-1/-1/0/14NEXTGENBIOWEAPONS.PDF>.

¹⁶⁰ Stephan Kravchenko, "Future of Genetically Modified Babies May Lie in Putin's Hands," *Bloomberg*, September 28, 2019, accessed November 28, 2019, <https://www.bloomberg.com/news/articles/2019-09-29/future-of-genetically-modified-babies-may-lie-in-putin-s-hands>.

genetic database of the Russian population. The combined military and medical establishment research lent further credence to the possibility of gene therapy militarization.

Section V: United States Case Study

United States Doping in the Olympics

The modern management of doping prevention within the United States began with an elaboration on the structure of Olympic sports doping controls. US anti-doping controls reside under the United States Olympic and Paralympic Committee (USOPC), formally established in 1978. Signed by President Carter, the Amateur Sports Act was further modified in 1998 by the Ted Stevens Olympic and Amateur Sports Act.¹⁶¹ Following the creation of the World Anti-Doping Agency in 1999, and concern from allegations made over possible US sanctioned doping, the United States Olympic Committee created the United States Anti-Doping Agency (USADA), in 2000.¹⁶² According to their website, it was recognized by the US Congress as the official anti-doping organization for “Olympic, Paralympic, Pan American and Parapan American sport,” giving it broad jurisdiction.¹⁶³ Its mission is to “protect clean athletes, inspire true sport, and preserve the integrity of competition.”¹⁶⁴ This mission mimicked the World Anti-Doping Code, established in March 2003. This has normalized anti-doping rules and regulations for all sports and countries which are signatories.¹⁶⁵

The first sanctioned case of doping concerning US Olympic athletes was in 1972 at the Munich Olympics. Swimmer Rick DeMont tested positive for trace amounts of the stimulant

¹⁶¹ “History,” United States Olympic and Paralympic Committee, accessed March 1, 2020, <https://www.teamusa.org/About-the-USOPC/History>.

¹⁶² Paul C. McCaffrey, “Playing Fair: Why the United States Anti-Doping Agency's Performance-Enhanced Adjudications Should Be Treated as State Action,” *Washington University Journal of Law and Policy* 22 (2006): 646.; “Independence and History,” USADA, accessed March 1, 2020, <https://www.usada.org/independence-history/>.

¹⁶³ “Independence and History,” USADA.

¹⁶⁴ “Strategic Plan,” USADA, <https://www.usada.org/about/strategic-plan/>.

¹⁶⁵ McCaffrey, 647.

Ephedrine, and was disqualified.¹⁶⁶ DeMont had won the gold medal for the 400-meter men's freestyle event. He became the first United States athlete disqualified after drug controls were established in 1968.¹⁶⁷

The 1976 Montreal Olympics implemented the first drug testing for anabolic steroids. Two athletes from the men's weightlifting team were disqualified from competition.¹⁶⁸ Neither of the athletes, Mark Cameron, or Phillippe Grippaldi, were medal winners. However, after the Olympics, the comparative performance of United States athletes against European athletes prompted the United States Olympic Committee to approve a panel of experts. Led by Dr. Irving Dardik, the panel explored the science and medical aspects of sports performance. In a 1976 article, the New York Times quoted Dardik, stating he would develop "modalities" to safely enhance performance, including research surrounding anabolic steroids and the new phenomenon of blood doping.¹⁶⁹ Over time, Dardik fostered the role of physician support to athletes in training and competition for the Olympic Games. He led an investigation that ultimately uncovered the use of blood doping for performance enhancement by the 1984 United States Olympic Cycling team.¹⁷⁰ The US boycotted the 1980 Moscow Olympic Games as a result of the Soviet Army's

¹⁶⁶ Charles L. Dubin, *Commission of Inquiry into the Use of Drugs and Banned Practices Intended to Increase Athletic Performance* (Ottawa, CA: Canadian Government Publishing Centre, 1990), 353, accessed February 1, 2020, [http://www.doping.nl/media/kb/3636/Dubin-report-1990-eng%20\(S\).pdf](http://www.doping.nl/media/kb/3636/Dubin-report-1990-eng%20(S).pdf).

¹⁶⁷ Rajkumar Sharma, "Analytical Study of Doping Cases of Banned Substances During Olympics Games from 1968 to 2012," *International Journal of Physical Education, Sports and Health* 3, no. 3 (2016): 32, accessed March 1, 2020, <http://www.kheljournal.com/archives/2016/vol3issue3/PartA/3-2-65-648.pdf>.

¹⁶⁸ Ibid.

¹⁶⁹ Neil Amdur, "Effect of Drugs to Aid Athletes Studied by U.S.," *New York Times*, August 22, 1976, accessed March 1, 2020, <https://www.nytimes.com/1976/08/22/archives/effect-of-drugs-to-aid-athletes-studied-by-us-panel-of-us-olympic.html>.

¹⁷⁰ Jerry DeMarco, "\$1.2 Million in Unpaid Support Puts Former Surgeon, 76, in Bergen Jail," *Daily Voice*, February 23, 2013, accessed March 1, 2020, <https://dailyvoice.com/new-jersey/hackensack/police-fire/12-million-in-unpaid-support-puts-former-surgeon-76-in-bergen-jail/636107/>.

invasion of Afghanistan.¹⁷¹ The boycott demonstrated the function of the Olympics as a chess piece in the US strategy for demanding change to Soviet actions as a political objective.¹⁷²

No US athletes tested positive during testing at the 1984 Los Angeles Olympics, though as many as eighty-six failed testing prior to competition.¹⁷³ The United States Olympic Committee tested athletes prior to the opening of the games, and allowed most to continue competition despite doping indications. In fact, the United States Olympic Committee initially resisted testing athletes for testosterone, despite the International Olympic Committee's requirement to do so.¹⁷⁴

Despite their reluctant acquiescence, the Los Angeles drug testing facilities found none of the 83 gold, 61 silver, or 30 bronze medals achieved by Americans to have involved doping.¹⁷⁵ This result was overshadowed by the loss of many test results before their public release, due to the theft of records from the Los Angeles Organizing Committee.¹⁷⁶ The gap in the records created significant doubt on the clean US record.

The 1984 games also exposed blood doping. A significant number of the United States Olympic cycling team riders were administered secret blood transfusions to improve their

¹⁷¹ Barry Lorge, "U.S. Olympic Panel Likely to Back a Boycott," *Washington Post*, January 21, 1980, accessed March 1, 2020, <https://www.washingtonpost.com/archive/politics/1980/01/21/us-olympic-panel-likely-to-back-a-boycott/aa9dbf56-62bd-489a-87da-3b521bbf7be9/>.

¹⁷² John A. Tures, "How the US Boycott of the 1980 Olympics Still Influences the Event Today," *Observer*, December 21, 2017, accessed March 1, 2020, <https://observer.com/2017/12/1980-olympic-boycott-effects-examined-in-lead-up-to-2018-winter-games/>.

¹⁷³ Associated Press, "U.S. Cyclists Tested Caffeine as an Aid," *New York Times*, January 11, 1985, accessed March 1, 2020, <https://www.nytimes.com/1985/01/11/sports/us-cyclists-tested-caffeine-as-an-aid.html?searchResultPosition=1>.

¹⁷⁴ Associated Press, "Drug Testing at Issue," *New York Times*, April 29, 1983, accessed March 1, 2020, <https://www.nytimes.com/1983/04/29/sports/drug-testing-at-issue.html>.

¹⁷⁵ Thomas Mitchell Hunt, "Drug Games: The International Politics of Doping and the Olympic Movement, 1960-2007" (doctoral dissertation, University of Texas, 2007), 109.

¹⁷⁶ *Ibid.*

performance capability.¹⁷⁷ The blood-doping was disclosed by team doctor, Dr. Thomas B. Dickson, who released the names of at least five United States medal winners, including Steve Hegg, Leonard Nitz, Brent Emery, Rebecca Twigg, and Pat McDonough.¹⁷⁸ Importantly, at least three Olympic and US cycling officials were involved in the incident. These included Eddy Borysewicz, the national Olympic cycling coach, Ed Burke, the United States Cycling Federation's Elite Athlete Program director, and Mike Fraysse, previously president of the federation, and then vice president. Borysewicz and Burke were issued thirty day suspensions, while Fraysse was demoted to third vice president.¹⁷⁹ Sanctions were mild because blood doping was not yet banned as a performance-enhancing practice. The beta blockers used by many pentathlete competitors were in this category as well. No athletes were sanctioned. Athletes and their teams had executed a successful strategy for using new performance substances that weren't yet banned, which enabled the United States to win and retain their record nine Olympic cycling medals.¹⁸⁰

US athletes competed in the 1988 Seoul Olympic Games, and none were found to be in violation of doping rules. The focus was on Canadian Ben Johnson after his world record breaking gold medal performance in the 100 meter run, and subsequent disqualification for doping. At the same time, a US athlete tested positive for a testosterone ratio of more than 6:1, a level normally far beyond acceptable levels.¹⁸¹ As a member of a team, this athlete subjected his entire team to disqualification, but US officials effectively convinced the International Olympic

¹⁷⁷ Robert Thomas Jr., "U.S.O.C. Checking Use of Transfusions," *New York Times*, January 10, 1985, accessed March 1, 2020, <https://www.nytimes.com/1985/01/10/sports/usoc-checking-use-of-transfusions.html>.

¹⁷⁸ Ibid.

¹⁷⁹ Associated Press, "Cycle Group Bans Use of Blood Doping," *New York Times*, January 19, 1985, accessed March 1, 2020, <https://www.nytimes.com/1985/01/19/sports/cycle-group-bans-use-of-blood-doping.html>.

¹⁸⁰ Ibid.

¹⁸¹ Robert Voy and Kirk D. Deeter, *Drugs, sport, and politics* (Chicago, IL: Leisure Press, 1991), 112.

Committee that his testosterone levels were a natural occurrence.¹⁸² The New York Times reported in their investigation of steroids and other performance enhancing substances that at least half of the 9,000 Seoul competitors benefited from their use.¹⁸³

Two US athletes were disqualified during the 1992 Barcelona Olympics for the use of Clenbuterol, a banned substance. These included Bonnie Dasse, and Jud Logan.¹⁸⁴ Dasse was a female shot-putter, and Logan a hammer thrower. Prince Alexandre de Merode, Chariman of the International Olympic Committee, told the associated press that Dasse admitted obtaining the substance from a friend, indicating team coaches were not involved.¹⁸⁵

The 1996 Olympic Games in Atlanta were accompanied by two cases of US athletes sanctioned by the International Olympics Committee, as well as allegations of cover-ups. Initially, doping sanctions were limited to Sandra Farmer-Patrick and Mary Slaney. However, when two more American athletes tested positive for banned drugs, this prompted Carl Lewis, a former Olympian, to allege that United States track and field officials were withholding information.¹⁸⁶

Bay Area Laboratory Cooperative and the 2000 Sydney Games

The Most famous US doping case centered on the use of performance enhancing drugs by Olympic track athlete Marion Jones in the 2000 Olympic Games in Sydney, Australia. Jones, a track and field competitor, was selected in December 2000 as the Associated Press female athlete of the year for her Olympics performance. She had won five medals in the games, including three gold medals and two bronze medals in the 100 meter, 200 meter, 1,600 relay, long jump, and 400

¹⁸² Voy, 112.

¹⁸³ Michael Janofsky, "BARCELONA; U.S. Female Shot-Putter Banned After Drug test," *New York Times*, August 9, 1992, accessed March 1, 2020, <https://www.nytimes.com/1992/08/09/sports/barcelona-us-female-shot-putter-banned-after-drug-test.html>.

¹⁸⁴ Sharma, 32.

¹⁸⁵ Michael Janofsky, "BARCELONA; U.S. Female Shot-Putter Banned After Drug test".

¹⁸⁶ Independent, "Athletics: Lewis slates US 'Cover Up'," *Independent*, May 22, 1997, accessed March 1, 2020, <https://www.independent.co.uk/sport/athletics-lewis-slates-us-cover-up-1262892.html>.

meter relay respectively.¹⁸⁷ She would remain untarnished until an anonymous source sent an unknown drug in a used syringe to the US Anti-doping Agency in 2003.¹⁸⁸

The anonymous source of the used syringe provided information that kickstarted a comprehensive investigation. The source shared that Olympic athletes were given the substance by a nutrition company in California. Dr. Don Catlin from the Olympic Analytical Lab identified it as an anabolic steroid, and developed testing methods for its detection.¹⁸⁹ State and Federal Law enforcement also raided the Bay Area Laboratory Cooperative, and seized documents which identified professional and Olympic athletes.¹⁹⁰

Marion Jones later admitted in October 2007 to using banned substances during the 2000 Olympic Games. The International Olympic Committee Disciplinary Commission recommended she be stripped of all medals and placings earned during the 2000 Sydney Games, the 2004 Athens Games, and be banned from competition at the 2008 Beijing Games.¹⁹¹ The International Olympic Committee accepted these recommendations in December 2007.¹⁹²

The Bay Area Laboratory Cooperative investigation revealed that US authorities, and the United States Anti-doping Association had no tolerance for drug use in the new millennium. The US Department of Justice indicted four individuals with forty-two counts of money laundering and illegal drug distribution. These indictments targeted the corporate executive officer, the vice

¹⁸⁷ Associated Press, “AP Names Jones Female Athlete of Year,” *CBS News*, December 27, 2000, accessed March 1, 2020, <https://www.cbsnews.com/news/ap-names-jones-female-athlete-of-year/>.

¹⁸⁸ Nicholas C. Athey and Martin Bouchard, “The BALCO Scandal: the Social Structure of a Steroid Distribution Network,” *Global Crime* 14, no. 2-3 (2013): 216.

network216.

¹⁸⁹ Ibid.

¹⁹⁰ Ibid.

¹⁹¹ International Olympic Committee, *IOC Disciplinary Recommendations Regarding Ms Marion Jones*, December 12, 2007, accessed November 28, 2019, 3, accessed March 1, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/IOC-Disciplinary-Commission-Recommendations-Regarding-Ms-Marion-Jones.pdf>.

¹⁹² International Olympic Committee, “Marion Jones Disqualified,” *IOC News*, December 12, 2007, accessed February 18, 2020, <https://www.olympic.org/news/marion-jones-disqualified>.

president, and Remi Korchemny, the Olympic sprinting coach. Later Patrick Arnold, the creator of the novel anabolic steroid, and Trevor Graham, the anonymous source and whistleblower, were indicted as well.¹⁹³ Soviet born sprinting coach Remi Korchemny became the first coach USADA disciplined. The United States Anti-doping Association banned Korchemny from any future work with organizations operating under the World Anti-Doping Association code. These included the Olympics, the International Association of Athletics Federations, and USA Track and Field.¹⁹⁴

Other athletes besides Marion Jones doped during the 2000 Sydney Olympic Games as well. The US men's 4 x 400-meter relay team initially achieved gold medals as well. Team members included Michael Johnson, Antonio Pettigrew, Jerome Young, and the twins Calvin and Alvin Harrison.¹⁹⁵ Jerome Young was disqualified first. Young had tested positive for steroids in 1999, but was cleared to compete during the 2000 Olympics by an appeals board conducted by USA Track and Field, although they did not notify the International Olympic Committee or the International Association of Athletics Federation.¹⁹⁶ The Court for Arbitration of Sport overturned the USA Track and Field decision in 2004. They declared the decision to allow Young to compete was erroneous, and stripped him of his medal.¹⁹⁷ Teammate Pettigrew testified he used multiple performance-enhancing drugs from 1997 to 2001 during Coach Trevor Graham's

¹⁹³ Athey, 217.

¹⁹⁴ Gene Cherry, "Balco Coach Korchemny Disciplined by USADA," *Reuters*, March 12, 2007, accessed December 16, 2019, <https://www.reuters.com/article/us-doping-athletics-korchemny/balco-coach-korchemny-disciplined-by-usada-idUSL1254111320070313>.

¹⁹⁵ Associated Press, "Jones Finishes Games on Golden Note," *ESPN News*, September 30, 2000, accessed November 29, 2019, <https://www.espn.com/oly/summer00/news/2000/0930/791121.html>.

¹⁹⁶ Alan Abrahamson and Randy Harvey, "IOC, WADA Team on Young Inquiry," *Los Angeles Times*, September 5, 2003, accessed March 1, 2020, <https://www.latimes.com/archives/la-xpm-2003-sep-05-sp-jeromeyoung5-story.html>.

¹⁹⁷ Court of Arbitration for Sport, *CAS 2004/A/628 IAAF v/USATF & J. Young* (Lausanne, 2004), 24, accessed March 1, 2020, [http://www.doping.nl/media/kb/720/CAS%202004_A_628%20IAAF%20vs%20USATF%20%26%20Jerome%20Young%20\(OS\).pdf](http://www.doping.nl/media/kb/720/CAS%202004_A_628%20IAAF%20vs%20USATF%20%26%20Jerome%20Young%20(OS).pdf).

May 2008 trial.¹⁹⁸ The United States Anti-Doping Association disqualified him the following month.¹⁹⁹ Alvin Harrison also admitted using a variety of performance enhancing drugs in 2004, as part of the BALCO investigation. He and his brother Calvin tested positive for banned stimulants, and were sanctioned in 2004.²⁰⁰ The International Olympic Committee stripped the entire team of their medals in 2008.²⁰¹ Notably, the United States Olympic Committee had challenged the recommendation by the International Association of Athletics Federation to disqualify the entire team since 2004.²⁰² The Court of Arbitration for Sport overturned the Federation's decision in 2004, but Pettigrew's public admission in 2008 saw the team disqualified. The Nigerian team received gold medals in their place in 2012.²⁰³

Four US athletes were disqualified for doping during the 2004 Athens Olympics Games, though none of these disqualifications took place during or immediately after the games. Crystal Cox won gold in the women's 400 meter relay, and wasn't disqualified until late 2010, after being

¹⁹⁸ Associated Press, "Sprinter Antonio Pettigrew Admits Doping," *ESPN*, May 23, 2008, accessed March 1, 2020, http://www.espn.com/espn/wire/_/section/oly/id/3409239.

¹⁹⁹ United States Anti-Doping Association, *Former U.S. Track Athlete, Antonio Pettigrew, Accepts Responsibility for Doping Violation*, June 3, 2008, accessed March 1, 2020, <https://www.usada.org/sanction/former-u-s-track-athlete-antonio-pettigrew-accepts-responsibility-for-doping-violation/>.

²⁰⁰ Philip Hersh, "Alvin Harrison Oks 4-Year Ban," *Orlando Sentinel*, October 20, 2004, accessed March 1, 2020, <https://www.orlandosentinel.com/news/os-xpm-2004-10-20-0410200315-story.html>; John Crumpacker, "His Run has Ended / Calvin Harrison Given 2-Year Ban by USADA," *SFGATE*, August 3, 2004, accessed March 1, 2020, <https://www.sfgate.com/sports/article/His-run-has-ended-Calvin-Harrison-given-2-year-2703736.php>.

²⁰¹ Karolos Grohmann, "U.S. Relay Team Stripped of Gold," *Reuters*, August 2, 2008, accessed March 1, 2020, <https://www.reuters.com/article/us-olympics-doping-pettigrew/u-s-relay-team-stripped-of-gold-idUSL272397020080802>.

²⁰² Jon Sarche, "USADA Bans Jerome Young for Life After Second Doping Violation," *MyPlainview*, November 9, 2004, accessed March 1, 2020, <https://www.myplainview.com/news/article/USADA-bans-Jerome-Young-for-life-after-second-8964739.php>.

²⁰³ Ben Wyatt, "Pettigrew, Patience and Pride: Nigeria's 12-year Wait for an Olympic Gold," *CNN*, August 12, 2012, accessed March 1, 2020, <https://www.cnn.com/2012/08/11/sport/nigeria-olympics-gold-pettigrew-delay/index.html>.

implicated by the Bay Area Laboratory Cooperation investigation.²⁰⁴ The International Olympic Committee and International Association of Athletics Federation announced in 2013 that remaining members could keep their gold medals, after allowing the time limit on deliberation to expire.²⁰⁵

Olympic Cyclist and team member Tyler Hamilton had previously denied doping at the Athens Games. Hamilton tested positive for blood doping during the Athens Games, but was not penalized because his backup sample was improperly stored.²⁰⁶ He had also tested positive for blood doping later in the same year, resulting in a two year ban. Hamilton later admitted to doping in June 2012 in a letter sent to the International Olympic Committee, and he was stripped of his gold medal.²⁰⁷ He claimed in a 2016 interview that the US was obsessed with gold medals, and that the entire cycling world was doping at the time. He also claimed that the US Postal Service cycling team “paid for, transported and administered” all drugs.²⁰⁸ The other two athletes disqualified, Marion Jones and Duane Ross, were disqualified as a result of the Bay Area Laboratory Cooperative investigation. Though Hamilton’s team was sponsored by the US Postal Service, the government was not involved in its operations.²⁰⁹

²⁰⁴ Gene Cherry, “Suspension Could Cost U.S. 2004 Olympic Gold,” *Reuters*, January 29, 2010, accessed March 13, 2020, <https://www.reuters.com/article/us-doping-athletics-cox/suspension-could-cost-u-s-2004-olympic-gold-idUSTRE60T01O20100130>.

²⁰⁵ Duncan Mackay, “Exclusive: USA allowed to keep Athens 2004 4x400m Relay Gold Medals Despite Drug Admission,” *Inside the Games*, May 31, 2013, accessed March 14, 2020, <https://www.insidethegames.biz/articles/1014467/exclusive-usa-allowed-to-keep-athens-2004-4x400m-relay-gold-medals-despite-drugs-admission>.

²⁰⁶ Juliet Macur, “Hamilton Admits Taking Drug and Retires From Cycling,” *New York Times*, April 17, 2009, accessed February 28, 2020, <https://www.nytimes.com/2009/04/18/sports/cycling/18cycle.html>.

²⁰⁷ International Olympic Committee, “IOC Strips Hamilton of Athens Gold,” *IOC News*, August 10, 2012, accessed February 22, 2020, <https://www.olympic.org/news/ioc-strips-hamilton-of-athens-gold>.

²⁰⁸ David Erickson, “Former Olympic Gold Medalist Tyler Hamilton Recalls Doping Scandal During Chamber Banquet,” *Missoulian*, September 14, 2016, accessed February 1, 2020, https://missoulian.com/news/local/former-olympic-gold-medalist-tyler-hamilton-recalls-doping-scandal-during/article_c90847bb-5d54-51aa-aec7-5a5e7aa1ab25.html.

²⁰⁹ Brent Palmer, “Neither Snow Nor Rain Nor Steep Hills... Why did the U.S. Postal Service Sponsor a Cycling Team?,” *Slate*, January 18, 2013, accessed February 2, 2020, <https://slate.com/news->

The 2008 Beijing and the 2012 London games would see three US athletes found guilty of doping. Equestrian Courtney King used the arthritis medication Felbinac to treat her horse, and was disqualified along with her team.²¹⁰ In 2012, judo competitor Nicholas Delpopolo was also disqualified as a result of post competition testing for cannabis. Lastly, Tyson Gay was disqualified in May 2014 as the result of a United States Anti-Doping Association investigation in 2013.²¹¹ Gay was found guilty of using a prohibited substance as early as July of 2012, prior to the London games. Sources claimed Gay was unknowingly dosed by chiropractor Clayton Gibson III with an anabolic steroid cream.²¹² Another athlete from Trinidad who had been training with Gay, and who was treated by Gibson also tested positive.²¹³ The cream Gay used listed two banned substances, Testosterone and DHEA as ingredients.²¹⁴

The 2012 London Games were the last to find US competitors doping. Subsequent retesting with improved detection methods by the International Olympic Committee for Beijing, and London in 2017 failed to demonstrate US doping.²¹⁵ Retesting for the 2017 Sochi games only examined Russian athletes, and did not retest any US athletes.²¹⁶

and-politics/2013/01/lance-armstrong-doping-scandal-why-did-the-postal-service-sponsor-him-in-the-first-place.html.

²¹⁰ New York Times, “Courtney King and U.S. Olympic Dressage Team Disqualified,” *New York Times*, September 22, 2008, accessed February 1, 2020, <https://www.nytimes.com/2008/09/22/sports/22iht-olydoping22.16375787.html>.

²¹¹ USADA, “US Track and Field Athlete, Gay, Accepts Sanction for Anti-Doping Rule Violation,” *USADA*, May 2, 2014, accessed February 1, 2020, <https://www.usada.org/sanction/us-track-field-athlete-gay-accepts-sanction-for-anti-doping-rule-violation/>.

²¹² David Epstein, “Cheat Sheet: The Tyson Gay File,” *PROPUBLICA*, May 2, 2014, accessed February 1, 2020, <https://www.propublica.org/article/cheat-sheet-the-tyson-gay-file>.

²¹³ *Ibid.*

²¹⁴ *Ibid.*

²¹⁵ International Olympic Committee, *IOC Reanalysis Programme Beijing 2008 and London 2012*, January 25, 2017, accessed February 2, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/IOC-reanalysis-programme.pdf>.

²¹⁶ International Olympic Committee, *IOC Reanalysis Programme – Sochi 2014*, December 22, 2017, accessed February 2, 2020, <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/IOC/Who-We-Are/Commissions/Disciplinary-Commission/IOC-reanalysis-programme.pdf>.

State of Gene Editing Legislation and the Influence of Special Interest Groups

The US policies towards gene editing have closely aligned with those of the World Health Organization, and have been strongly influenced by special interest groups within the scientific community. The US has not passed laws against genome editing, but has passed laws governing research using human embryos, and genomic research involving the editing of embryos.²¹⁷ In terms of regulation, the US Food and Drug Administration has regulated products and drugs involving gene editing.²¹⁸ The US has also relied on private special interest group's advice and research to formulate policy.

The primary special interest groups in the medical field which have informed US national policy on a regular basis, including gene editing policy, are the National Academies for Sciences. The National Academies of Sciences launched an initiative during 2015 to advise the nation on the technological breakthroughs in gene editing including CRISPR-Cas9.²¹⁹ Since that time, the academies have held summits in 2015 and 2019 respectively.²²⁰

More recently, gene editing has featured prominently in US legislative bills being developed through the US House of Representatives, and the Senate to fund research and innovation in genomic technology. One bill, House Resolution 4633, known as the Investing in

²¹⁷ Rumiana Yotova, "The Regulation of Genome Editing and Human Reproduction Under International Law, EU Law and Comparative Law," Nuffield Council of on Bioethics, June 2017, 45, accessed March 1, 2020, <https://www.nuffieldbioethics.org/wp-content/uploads/Report-regulation-GEHR-for-web.pdf>.

²¹⁸ *Ibid.*, 45.

²¹⁹ The National Academies of Sciences, Engineering, and Medicine, "International Summit on Human Gene Editing," accessed February 6, 2020, <https://www.nationalacademies.org/our-work/international-summit-on-human-gene-editing>.

²²⁰ The National Academies of Sciences, Engineering, and Medicine, "International Commission on the Clinical Use of Human Germline Genome Editing: Commission Meeting #2," accessed February 6, 2020, <https://www.nationalacademies.org/event/11-14-2019/international-commission-on-the-clinical-use-of-human-germline-genome-editing-commission-meeting-2>.

Safety and Innovation Act of 2019, has been proposed to provide funding for FDA projects.²²¹ The bill would provide twenty-five million dollars in funding for gene therapy research. As of March 2020, it resided with the House Subcommittee on Health. Another bill, House Resolution 2500, the National Defense Authorization Act for Fiscal Year 2020, passed the House and Senate in July and December 2019 respectively. It directed the National Institute of Health to “identify specific genetic and molecular targets and biomarkers for triple negative breast cancer”, which is within the realm of gene therapy research.²²²

The United States Senate has also drafted legislation specifically in response to Russia’s doping scandal that was uncovered by the McLaren Investigation. Named the “Rodchenkov Anti-Doping Act,” it rested with the Senate Committee on Commerce, Science, and Transportation as of March, 2020.²²³ Section four of the act would create criminal penalties against those who “knowingly carry into effect, attempt to carry into effect, or conspire with any other person to carry into effect a scheme in commerce to influence by use of a prohibited substance or prohibited method any major international sports competition.”²²⁴ The act would effectively ban state-sponsored gene therapy schemes because gene therapy is banned by the World Anti-Doping Association and United States Anti-Doping Association.

The United States, like Russia, has researched genetic engineering technology within defense organizations. The Defense Advanced Research Projects Agency initiated their “Safe Genes” program in 2017 to “establish a ‘safety by design’ strategy for guiding the development

²²¹ Investing in Safety and Innovation Act , H. Res. 4633, 116th Cong., 1st sess. (October 14, 2019): 4, accessed January 15, 2020, <https://www.congress.gov/bill/116th-congress/house-bill/4633>.

²²² National Defense Authorization Act for Fiscal Year 2020, H. Res. 2500, 116th Cong., 1st sess. (September 10, 2019): 637, accessed November 20, 2019, <https://www.congress.gov/bill/116th-congress/house-bill/2500/text>.

²²³ Rodchenkov Anti-Doping Act of 2019, S. Res. 259 116th Congress., 1st sess. (January 29, 2019): 8-9, accessed December 2, 2019, <https://www.congress.gov/bill/116th-congress/senate-bill/259/text>.

²²⁴ Ibid.

of an array of powerful, emergent genome editing technologies.”²²⁵ Part of the programs purpose was to “enable the pursuit of novel genetic solutions that support public health and military force protection and readiness.” The “Safe Gene” program has been reported by the Defense Advanced Research Project Agency to be successfully developing more effective gene editing technologies and anti-gene editing technologies. According to the Agency, the latter had the potential to deny “unsanctioned use of editors against an individual or in a given environmental setting.”²²⁶

²²⁵ DARPA, “Safe Genes Tool Kit Takes Shape,” October 15, 2019, accessed December 5, 2019, <https://www.darpa.mil/news-events/2019-10-15>.

²²⁶ Ibid.

Section VI: Findings, Analysis, and Conclusion

As a primary research question, this study attempted to determine the probability for the use of gene therapy and engineering in military applications through the examination of doping in Olympic competition. The Olympics functioned as a proxy for great-power competition for the purpose of this study. They were also used to gauge state proclivity for using performance enhancing medical technology to enhance inter-state competitiveness. As a result, the case studies demonstrated vastly different levels of interest between the US and Russia in sponsoring Olympic doping. These interests, in conjunction with each country's legislation, special interest group influence, and military medical research, were able to link the potential for gene therapy use in military applications with the prevalence of Olympic state-sponsored doping.

Russia's state form, function, and processes supported the use of performance enhancement in Olympic athletes. Russia will likely continue to support this trend with gene therapy. Though United States officials were complicit in attempts to hide athlete doping during the early establishment of doping controls, no systemic doping was uncovered. In fact, the United States turned strongly against doping from the 2000 Olympics onward. The United States and Russia have dedicated research towards genetic engineering technology, and both have considered its application in relation to soldiers. However, only Russia has openly stated its intent to research the application of genetic research for enhancing soldier performance. The Russian legislature and internal special interest groups support this progress.

The complexity of Russian doping was revealed by the McLaren investigation. This cannot be taken at face value as the best evidence of state-sponsored performance enhancement due to several factors. First, during the evolution of the Olympic Games, both countries attempted to slow down the application of drug testing, to create supporting medical programs for the improvement of athlete performance, and to apply performance enhancing technology ahead of banned applications from regulatory authorities. The United States and Russia shared instances

within the modern Olympic Games where performance enhancement was, if not completely state-endorsed, tacitly accepted, expected, or excused in a bid to improve the performance of their respective countries during competition. Russia distinguished its actions from the US through greater scale and complicity of government involvement. Russia demonstrated a depth of state-sponsored involvement of officials and created organizations around which the performance enhancement of athletes could occur.

In answering the primary research question, this study found that Russia sponsored performance enhancing doping use in the Olympics, and that this behavior suggests the potential use of gene therapy. In contrast, the United States moved towards stricter penalties for US athlete doping within the Olympics, and sponsorship of doping occurred primarily among individuals and private organizations. For Russia, state sponsorship evolved over time and adapted doping implementation to work synergistically with, or to subvert doping control systems.

Russia made changes to their doping strategy over past decades to accommodate increasing oversight and improved drug detection, and to maintain a competitive advantage against other nations. In early Russian doping, performance enhancing drugs were improving more quickly than testing methodologies. This allowed the development and use of drug protocols without fear of detection. Russia also exploited doping loopholes by using drugs such as testosterone at a time when testing could not distinguish the drug from the naturally endogenous substance. Russian medical research also developed performance enhancing drugs such as Bromantane, which were unknown to doping control organizations. These adaptations demonstrated an iterative process to ensure that Russians continued to deliver gold medals for the improvement of their international prestige.

The 2014 Sochi Games were the last where Russia was permitted national representation. These games also demonstrated the culmination of Russia's subversion of doping control systems, and illustrated advanced doping techniques. Russia won eight gold medals, and twelve silver medals at the Sochi Games that were later found to have been enabled by systemic Russian

doping. These athletes were all implicated in the “disappearing positive methodology” scheme, where samples disappeared or were tampered with through the cooperation of the Russian Security Services, and the head of the Moscow laboratory. The Court of Arbitration for Sport eventually returned many of their medals, but only because the evidence and data of the Moscow laboratory were corrupted beyond use.

Russian state-sponsored doping was endemic at multiple levels of government and between organizations. The Russian Security Services, the Ministry of Sport, the Russian Anti-Doping Agency, and the Moscow laboratory were all complicit in enabling their athletes to dope. Organizational leaders developed doping plans with the specific intent to increase Russia’s international performance at the Olympics and demonstrated that the Russian government worked cooperatively to permit doping. In the case of the Sochi games, Russia claimed that the doping was orchestrated solely by Dr Rodchenkov. However, the data provided by the Russian government meant to prove Rodchenkov’s sole guilt was shown to have been falsified. The complexity of data alteration and the conduct of data alteration under government oversight further demonstrated evidence of deeply rooted doping complicity within the Russian government. It is important to note that Russian Minister of Sport Kolobkov supported the false data. Though Russia’s argument implied the sole involvement of Dr. Rodchenkov and a few others, the depth of the doping culture discovered by the WADA’s investigative team implied the collusion of athletes, coaches, Russian government organizations, and possibly the highest levels of government. In combination, athletic use of performance enhancing drugs was accepted or enabled at all levels of their sports culture.

Russia defied international norms while the US embraced them. Russia continued to adapt state-sponsorship of doping over time, while the United States continued to tighten doping controls during the same period. The United States was clearly complicit in the concealment of potential doping in several Olympics, but never actively involved itself in doping protocols or the administration of drugs. Athletes such as cyclist Hamilton felt strong pressure to perform and

win, but the higher levels of athletic culture and the US government didn't support cheating as an acceptable method. The negative view towards doping become more entrenched over successive Olympic Games, and correspondingly fewer US Olympic athletes doped to achieve a competitive edge. Though it is possible that future sample retesting could prove otherwise, currently the US has not had an athlete test positive for performance enhancing drugs since the 2012 London Games. More advanced drug testing is likely catching US athletes prone to doping before advancement to the Olympics, indicating a US sporting culture that is intolerant of doping.

The differences between US and Russian genetic research appear subtle at first glance. Both the United States and Russia have demonstrated intent to use genetic technology to benefit their soldiers. The United States has supported this through DARPA's research conducted by cutting-edge "Safe Genes teams" such as those at Massachusetts General Hospital and the University of California, Berkeley. Russia has also conducted a cooperative genetic research effort between their Military Medical Academy and the Ministry of Health. Both the US and Russia have or are implementing genetic databases for soldiers. The US announced its database in 1992.²²⁷ The difference between the US and Russia lies instead in their professed goals. While DARPA has focused on consistency with the National Biodefense Strategy, to include military force protection and readiness, Russia has already discussed genetics research with performance enhancement in mind. This is an indicator for future military gene therapy application. To date, the US has only used their military genetic database for casualty identification.

In examining the state of legislation concerning gene therapy in the US and Russia, this study found that Russian legislation largely permits genetic engineering technology, while the US more strictly regulated the technology. Russian federal law prohibited interfering with human embryo development, which may preclude germline editing. However, both US and Russian

²²⁷ Warren E. Leary, "Genetic Record to Be Kept on Members of Military," *New York Times*, January 12, 1992, accessed January 3, 2020, <https://www.nytimes.com/1992/01/12/us/genetic-record-to-be-kept-on-members-of-military.html>.

federal law have not prohibited somatic cell editing, making military gene therapy among adults acceptable under both country's laws. As demonstrated by US compliance with Olympic anti-doping regulations, the US will comply with established rules and oversight through the US Food and Drug Administration. Conversely, Russia will subvert or change their organizations and laws to allow gene therapy or doping. Gene therapy in Russia will demonstrate the same systems strategy Russian implemented for state-sponsored Olympic doping, where internal system agents adapted their functions to serve the system's purpose of supporting international competition.

Russian law has already established precedent for genetic technology use by requiring that women undergo genetic tests prior to embryo implantation if they have a hereditary disease. Putin's recent decree establishing a genetic certification database for the Russian population further established this precedent. The decree also created a foundation for compiling research data to improve gene therapy technology. Lastly, but perhaps most importantly, Russian President Putin has strong control over the implementation of gene therapy, and almost no restrictions should he decide to change the law.²²⁸

Conclusion

Russia's subversion of the rules-based Olympic competitions is symptomatic of how they may purposefully appear compliant with international norms concerning gene editing, while inwardly applying research to military soldiers. Both the United States and Russia are likely to use gene therapy to enhance soldier performance, but Russia will implement it first. They will publicly applaud the World Health Organization's moratorium on human gene editing, while gradually continuing research under the auspices of life-saving medicine. Russia's medical research organizations will adapt themselves to the desired outcome of the regime in a similar fashion to the adaptation which took place in Russian anti-doping organizations. Except, instead

²²⁸ Isaac Chotiner, "How Putin Controls Russia," *New Yorker*, January 23, 2020, accessed February 2, 2020, <https://www.newyorker.com/news/q-and-a/how-putin-controls-russia>.

of advancing Russian international competition through athletes, gene therapy in this instance will provide a credible deterrent and military advantage against Russia's adversaries.

Further research should be conducted to identify indications that Russia is adapting its medical research institutions to more definitively accomplish its military and strategic objectives, while outwardly appearing compliant with international medical norms. Possible indicators for the use of military gene therapy should be monitored through associations identified between known Russian military and medical research groups. US compliance with international norms concerning gene therapy should not create an expectation of compliance in Russia. The US advantage in gene therapy technology may prove illusory if Russia is allowed to advance unnoticed.

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