



# Performance Enhancing Drugs: History, Medical Effects & Policy

The Harvard community has made this article openly available. [Please share](#) how this access benefits you. Your story matters

Citation	Performance Enhancing Drugs: History, Medical Effects & Policy (2006 Third Year Paper)
Citable link	<a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:8848241">http://nrs.harvard.edu/urn-3:HUL.InstRepos:8848241</a>
Terms of Use	This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA">http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA</a>

Microsoft Word 10.0.6612;

# **Performance Enhancing Drugs: History, Medical Effects & Policy**

**Yu-Hsuan Lee**

**Class of 2006**

**April 2006**

**This paper is submitted in satisfaction of both the course requirement and the third year  
written requirement.**

## **Abstract**

The goal of this paper is to serve as a general treatise on the vast topic of use of performance enhancing drugs in athletic competition. It begins by laying out the extensive history of doping in sports, from the ancient Romans to the East German Olympic swim team to the steroids scandal in baseball. The paper moves on to describe and discuss the many medical effects that use of performance enhancing drugs might trigger. The paper concludes by discussing the appropriateness of anti-doping policy in general by analyzing and scrutinizing the general strands of arguments that are used to support bans on doping. While many rationales are rejected, a few are ultimately accepted and they justify the implementation of anti-doping policies.

## **Introduction**

From the very beginning when humans have engaged in competitive sports, they have tried to gain every possible edge against their adversaries. After all, the desire for any and every competitive advantage is a completely understandable element of human nature. Not surprisingly, there are records of the use of performance enhancing drugs going as far back as ancient times. Despite this long and storied history of performance enhancing drugs in sports, doping is arguably the most controversial and most talked-about issue in modern sports. It is an issue that cuts across all sports, regardless of technology, popularity, or tradition. It affects the sports that are traditionally thought of as “muscle-bound,” such as football and body-building, but the issue has also appeared in other sports where bulk seems to be less important, such as women’s gymnastics and Olympic sledding.

This paper serves two purposes, as they relate to performance enhancing drugs. First, it lays out a general overview of the history and effects of performance enhancing drugs. Due to the overwhelming varieties and

methods of doping, this paper has a strong emphasis on anabolic steroids. It discusses some of the other performance enhancing drugs that have played public and instrumental roles in the history of doping, in order to give proper context to the issue and for the purposes of distinguishing among sports, but this paper deals primarily with anabolic steroids. The second part of this paper discusses the policy implications of current anti-doping regulations and enforcement. After years of nonexistent or lax enforcement, has the current environment shifted too far, such that the penalties for doping are excessive for the crime committed? On an even more fundamental level, are these regulations against performance enhancing drugs wise, fair, or even consistent? Should sports ban certain drugs, while allowing others? Most of the time, it is generally accepted that these rules should exist, but under closer analysis, the issue is not so clear. This paper analyzes the presumptions and preconceptions we have about the righteousness of anti-doping regulations and considers the possibility that anti-doping rules are not the given that we generally accept them to be. Perhaps, we should not take for granted that these rules are an integral and necessary part of competition.

### **Definition of Doping**

What exactly is doping? One popular source<sup>1</sup> defines doping as “the use of a drug or blood product to improve athletic performance.” However, we can see that such a simple definition is obviously much too broad to serve as a precise definition for doping. After all, under this definition, taking Tylenol to relieve muscle aches after a hard workout or using an asthma inhaler to prevent the constriction of the airway and to allow proper respiration,<sup>2</sup> would be considered doping, but it is doubtful that many, if any, authorities would consider those actions to fall under the pejorative category of “doping.” Many other broad, philosophical definitions of doping also succumb to the same criticism – it is almost impossible to draw a line, *ex ante*,

---

<sup>1</sup>Dictionary.com, found at <http://dictionary.reference.com/search?q=doping>.

<sup>2</sup>Many of these asthma treatments also fall under the category of steroids, but they should not be confused with anabolic steroids. Under the section, “Medical Effects of Steroids,” this paper describes the steroids class of drugs, and what differentiates anabolic steroids from other types of steroids.

between accepted therapeutic use and illicit doping. Of the definitions that attempt to use a philosophical basis to define doping, the marginally more-helpful definitions seem to include a requirement that the act be “a violation of sporting ethics” or “against the principles of sportsmanship.”<sup>3</sup> I assert that in actuality, these definitions are not much more helpful than the one supplied by the dictionary, because there is no *ex ante* determination of what those principles of sportsmanship or sporting ethics are. As a result, we do not determine that use of a certain drug is doping *because* it violates the some ethic or principle of fairness, but rather we believe that it is doping and *thus* it violates the ethic or principle of fairness. In the end, while this more precise definition seems to provide more guidance and structure for what is considered doping, it is no less arbitrary and capricious than the basic definition set forth by the dictionary.

One organization that completely side-steps the issue of trying to precisely define doping is the World Anti-Doping Association (WADA).<sup>4</sup> WADA promulgated the World Anti-Doping Code<sup>5</sup> in 2003, in preparation for the 2004 Summer Olympics in Athens, Greece. The World Anti-Doping Code attempts to unify and standardize anti-doping regulations across all sports and all countries for the first time.<sup>6</sup> The definition for doping is set forth in Article 1, which says:

“Doping is defined as the occurrence of one or more of the anti-doping rule violations set forth in Article 2.1 through Article 2.8 of the *Code*.”<sup>7</sup>

The critical and more interesting aspects of Article 2 are as follow:

---

<sup>3</sup>The European Union uses such a definition, which can be found at the European Union website: [http://europa.eu.int/index\\_en.htm](http://europa.eu.int/index_en.htm).

<sup>4</sup>The role and history of the World Anti-Doping Association, whose website can be found at <http://www.wada-ama.org/en/>, is discussed in the following section, History of Doping.

<sup>5</sup>Available at: <http://www.wada-ama.org/rtecontent/document/code.v3.pdf>.

<sup>6</sup>An interesting note is that the World Anti-Doping Code is available, in official versions, in both French and English, but in the event of any conflict between the two versions, the English version prevails. <http://www.wada-ama.org/en/dynamic.ch2?pageCategory.id=250>.

“Article 2: Anti-Doping Rule Violations.  
The following constitute anti-doping rule violations:

2.1

The presence of a *Prohibited Substance*<sup>8</sup>  
or its *Metabolites*<sup>9</sup> or *Markers*<sup>10</sup> in an *Athlete’s*<sup>11</sup> bodily *Speci-*  
*men*<sup>12</sup>...

2.2 *Use*<sup>13</sup> or *Attempted Use*<sup>14</sup> of a *Prohibited Substance* or a *Prohibited Method*<sup>15</sup>.

2.2.1

The  
success or failure of the *Use* of a *Prohibited*  
*Substance* or *Prohibited Method* is not material.  
It is sufficient that the *Prohibited Substance* or  
*Prohibited Method* was *Used* or *Attempted* to  
be *Used* for an anti-doping rule violation to be  
committed.

2.3

Refusing, or failing without compelling  
justification, to submit to *Sample* collection after notification as  
authorized in applicable anti-doping rules or otherwise evading  
*Sample* collection.

2.4 Violation of applicable requirements regarding *Athlete* availability for *Out-of-Competition Testing*<sup>16</sup>  
including failure to provide required whereabouts information and missed tests which are based on reason-  
able rules.

2.5

---

<sup>13</sup>The application, ingestion, injection or consumption by any means whatsoever of any *Prohibited Substance* or *Prohibited Method*. *Id.* at 78.

<sup>14</sup>Purposely engaging in conduct that constitutes a substantial step in a course of conduct planned to culminate in the commission of an anti-doping rule violation. Provided, however, there shall be no anti-doping rule violation based solely on an *Attempt* to commit a violation if the *Person* renounces [*sic*] the attempt prior to it [*sic*] being discovered by a third party not involved in the *Attempt*. *Id.* at 73.

<sup>15</sup>Any method so described on the *Prohibited List*. *Id.* at 77.

<sup>16</sup>Any *Doping Control* which is not *In-Competition*. *Id.* at 76.

*Tampering*<sup>17</sup>, or *Attempting* to tamper,  
with any part of *Doping Control*<sup>18</sup>.

## 2.6 *Possession*<sup>19</sup> of *Prohibited Substances* and *Methods*:

### 2.6.1

*Possession*  
by an *Athlete* at any time or place of a substance  
that is prohibited in *Out-of-Competition Test-*  
*ing* or a *Prohibited Method* unless the *Athlete*  
establishes that the *Possession* is pursuant to a  
therapeutic use exemption . . . or other acceptable  
justification

### 2.6.2

*Possession*  
of a substance that is prohibited in *Out-of-*  
*Competition Testing* or a *Prohibited Method*  
by *Athlete Support Personnel*<sup>20</sup> in connection  
with an *Athlete*, *Competition* or training, unless  
. . . the *Possession* is pursuant to a therapeutic  
use exemption . . . or other acceptable justification.

## 2.7

*Trafficking*<sup>21</sup> in any *Prohibited Substance*  
or *Prohibited Method*.

## 2.8

---

<sup>19</sup>The actual, physical possession, or the constructive possession (which shall be found only if the *Person* has exclusive control over the *Prohibited/Substance/Method* or the premises in which a *Prohibited Substance/Method* exists); provided, however, that if the *Person* does not have exclusive control over the *Prohibited Substance/Method* or the premises in which a *Prohibited Substance/Method* exists, constructive possession shall only be found if the *Person* knew about the presence of the *Prohibited Substance/Method* and intended to exercise control over it. Provided, however, there shall be no anti-doping rule violation based solely on *possession* if, prior to receiving notification of any kind that the *Person* has committed an anti-doping rule violation, the *Person* has taken concrete action demonstrating that the *Person* no longer intends to have *Possession* and has renounced the *Person's* previous *Possession*. *Id.* at 76-77.

Administration or *Attempted* administration of a *Prohibited Substance* or *Prohibited Method* to any *Athlete*, or assisting, encouraging, aiding, abetting, covering up or any other type of complicity involving an anti-doping rule violation or any *Attempted* violation.”

What is interesting about that detailed and expansive definition is that nowhere in the definition does it try to define doping in terms of a violation of sportsmanship, sporting principle, or any other broad philosophical basis. Rather, the *Code* essentially defines doping as the use of any substance on the WADA-promulgated list of banned substances, for non-accepted purposes. This perfectly illustrates the practical definition of doping, especially in enforcement procedures: doping is whatever the organizing bodies, or other authorities, define as doping. There is no consistent overarching theme or principle; there is no broader concept or definition. Advancements and changes in doping occur so quickly and are so nuanced that a principled-definition is not sufficient, so the only workable definition is one that used a comprehensive list, and declares use of those substances to be doping, by fiat. Doping is what others consider doping to be.

## **History of Doping & Anti-Doping Efforts**

### *Sport and Doping in Ancient Times*

The term “doping” has its roots in the Dutch word *dop*, which was the name of an alcoholic beverage made of grape skins. It was supposed to act as a stimulant and to enhance the prowess of the South African Zulu warriors who drank the elixir. While the term “doping” was not introduced as part of popular vernacular until the late 19<sup>th</sup> century, the concept of using artificial means to gain an advantage in battle or competition has existed since ancient times. Athletes would drink special potions and eat specific meals with the belief, correct or not, that it would boost their performance.<sup>22</sup> “The Greek physician, Galen, is reputed to have prescribed ‘the rear hooves of an Abyssinian ass, ground up, boiled in oil, and flavoured with rose hips

---

<sup>22</sup>Antonio Buti & Saul Fridman, *Drugs, Sport and the Law* 27 (Scribblers Publishing 2001).



and rose petals' to improve performance.”<sup>23</sup> Ancient Olympic athletes attempted to boost testosterone (the hormone that anabolic steroids are designed to produce) by eating sheep testicles, a prime source for testosterone. In the Roman era, horses were fed substances that were believed to make the horses run faster in chariot races, and gladiators ingested substances that were supposed to make their fights more spectacular by pumping them up for the contests.<sup>24</sup> Besides using strychnine, a stimulant still used in the 20<sup>th</sup> century, the athletes of antiquity also used hashish, cola plants, cactus-based stimulants, and fungi, with varying success. Many sources actually indicate that one of the factors that led to the dissolution of the ancient Olympic Games was the overwhelming use of drugs, usually pharmacological agents such as extracts of mushrooms and plant seeds.<sup>25</sup> Lest one think that our competitive tendencies are directly attributable to the ancient Greeks and Romans, the ancient Norse warriors also doped, by taking hallucinogenic mushrooms to gear up for battle.

The onset of the Christian era marked the end of the overwhelming popularity of public sporting events. In 393 A.D., Emperor Theodosius promulgated a ban on all forms of “pagan” sports, including the Olympic Games.<sup>26</sup>

### *Beginnings of Modern Sports and Doping*

It wasn't until the middle of the 19<sup>th</sup> century, in the heart of the Industrial Revolution, that sporting events returned as a form of recreation and entertainment, as well as business. Not surprisingly, the first instances of doping in modern athletics did not occur long after the revitalization of sporting events. The

---

<sup>23</sup>*Id.* citing United States Olympic Committee, *Olympic Gold: a 100 Year History of the Summer Olympic Games* (Colorado, SEA Multimedia 1995).

<sup>24</sup>*Id.* at 28.

<sup>25</sup>*Id.*

<sup>26</sup><http://www.asda.org.au/antidoping/history.htm>

first documented case is in 1865, when Dutch swimmers used stimulants. Not long afterwards, in the late 19<sup>th</sup> century, European cyclists were using a multitude of drugs – from caffeine to ether-coated sugar cubes to Vin Mariani, a cocaine-laced wine – in order to alleviate the pain and exhaustion resulting from their sport. A Dutch cyclist died in 1886 from an overdose of cocaine and heroin, and in 1896, a Welsh cyclist, Arthur Linton died after taking strychnine (the same substance used by the ancient Romans).

By the time the first Games of the Olympiad, also known as the Summer Olympics, started in 1896, many performance enhancing drugs, such as codeine and strychnine, were available and in use. One of the most famous stories of early doping involves Thomas Hicks participating in the Third Olympic Games in St. Louis in 1904. During the race, Hick was given multiple doses of brandy laced with strychnine. After he collapsed upon crossing the finish line, it took four doctors to revive him sufficiently to rush him off to the hospital; it is generally speculated that even one additional dose of strychnine would have killed Hicks. Nevertheless, he was able to keep his gold medal.<sup>27</sup>

Afterwards, over the early part of the 20<sup>th</sup> century, there do not appear to be a significant number of reports of widespread doping, despite the lack of any bans or tests. This could be attributed to a number of issues. All the stories of death and illness that resulted from overuse of stimulants such as strychnine might have been sufficient to scare athletes away from using those drugs completely, especially since the stakes in amateur and professional sports were a lot lower during this era. Conversely, those stories might have simply made the athletes more cautious and deliberate in using the drugs. Since the stories of doping from this time are the result of death and/or serious illness, the cautious use by athletes would lead to no, or a negligible, amount of public harm, which is why there are few reports of doping during this time period. The records

---

<sup>27</sup>The race was a very irregular race, with lots of interesting details. Hicks was actually a British citizen, competing for the American team. More interesting is the story of New Yorker Fred Lorz, who was actually the first person to cross the finish line. Soon after he was named the winner, it was discovered that he had gotten tired, jumped into a car around mile 9 of the race, and rode until mile 20, where the car overheated and broke down. He then decided to run the rest of the way to the finish line. After getting disqualified from this race, and banned from amateur competition for a year, he went on to win the Boston Marathon.

of doping that occurred during this time were usually limited special potions, tinctures, lotions, and herbal extracts,<sup>28</sup> which were likely used with limited success. One notable exception was the use of nitroglycerine by sprinters in an attempt to dilate their arteries.

### *Discovery and Development of Anabolic Steroids*

If the advancement of performance-enhancing drugs was progressing at a slow, but steady pace, the arrival of Nazi Germany pushed the envelope at breakneck speed. By the 1930s, Nazi doctors had created anabolic steroids – testosterone that could be administered through a syringe – developed with the goal of increasing aggression in their troops. When the Olympics were held in Nazi Germany in 1936, Germany won the overall medal count with 89 medals, and the United States came in second with 56 medals. While there are no records confirming, or disproving, pervasive steroid use by the German team in those Olympics, circumstantial evidence argues that steroids at least played a role, particularly considering that a mere four years earlier, at the 1932 Olympics, the United States came in first with 102 medals, while Germany came in ninth, with only 20 medals. One cannot help but suspect that the dramatic improvement was at least partially attributable to the use of steroids by the German team.<sup>29</sup>

After World War II, the athletic climate mirrored the political climate. As the Cold War was building between the Western Allies and the Eastern Bloc, a similar arms race was occurring between the United States and the Eastern Bloc. The Russians, using captured German doctors, developed new anabolic steroids with the intention of delivering a political statement through its athletic success on the international stage –

---

<sup>28</sup>Buti & Fridman, *supra* at 29.

<sup>29</sup>Another possible, at least partial, explanation is the site of the Olympics. In 1932, the Olympics were held in Los Angeles, giving the United States a hometown advantage, while in 1936, the Olympics were held in Germany, giving the Germans a hometown advantage.

namely the 1952 Summer Olympics in Helsinki, Finland. The U.S.S.R. had never competed in the Olympics before, yet in their debut, they won 71 medals, behind only the United States, which won 76. Hungary came in a distant third with 42 medals.

This can be considered the start of the athletic cold war. Not to be left behind, the United States, with the help of its own German scientists, developed its own steroids. As the U.S.S.R. and the United States built up greater and greater stockpiles of nuclear weapons, its athletes, physicians, and chemists were developing stronger and more potent versions of performance-enhancing drugs. By the early 1960s, athletes in almost every field, from football to weightlifters to track and field, were ingesting steroids.

#### *First Steps Towards Anti-Doping*

Public opinion and efforts against doping are a relatively recent development, especially as compared to the history of doping. The first attempt to prohibit doping was made by the International Amateur Athletic Federation (IAAF)<sup>30</sup> in 1928. IAAF banned the use of doping, or the use of stimulating substances.<sup>31</sup> Many other international sports federations followed suit, but all of these bans were ineffective because there were no tests that were able to detect the use of banned substances. In the 1950s, the International Cycling Union (UCI) introduced drug testing programs and the French Association Nationale d'Education Physique formed a Doping Commission, but still, doping was not a significant issue that was discussed or debated within the public consciousness.<sup>32</sup>

The death of a Danish cyclist, Knut Jensen, at the 1960 Olympic Games held in Rome, changed all that. His autopsy revealed traces of amphetamines,<sup>33</sup> which prompted the international sporting community to

---

<sup>30</sup>In 2001, the organization changed its name to International Association of Athletics Federation, but was able to maintain the same acronym – IAAF. IAAF is the governing body for the sport of athletics, or track and field as it is known in the United States.

<sup>31</sup><http://www.wada-ama.org/en/dynamic.ch2?pageCategory.id=312>.

<sup>32</sup>Buti & Fridman, *supra* at 29-30.

<sup>33</sup>Ironically, it is likely not the amphetamine itself that was the direct cause of death. Jensen passed out during the competition, collapsed, and then fractured his skull. (From: [http://en.wikipedia.org/wiki/Knut\\_Jensen](http://en.wikipedia.org/wiki/Knut_Jensen)).

conduct a comprehensive analysis and discussion about the use of substances to improve athletic performance. Following the death of Jensen, a major international conference to discuss doping was held in Belgium in 1964.<sup>34</sup> Around the same time, French and Belgian legislatures took initial measures against doping by enacting laws that tried to curb the supply of drugs in the sporting arenas.<sup>35</sup> Most importantly, the International Olympic Committee (IOC) got into the act. It realized (or perceived) that doping would tarnish the reputation and prestige of sporting competition. By the 1964 Summer Olympics in Tokyo, it initiated a primitive form of testing for stimulants, such as amphetamines, in cycling events. In 1966, UCI, as well as the Fédération Internationale de Football Association (FIFA),<sup>36</sup> were among the earliest sports federations to implement and utilize doping tests in their world championships.<sup>37</sup>

This increased attention on doping was not sufficient in preventing the death of another athlete, Tom Simpson, a top British cyclist, in the 1967 Tour de France.<sup>38</sup> After his collapse during a climb and subsequent death, three tubes of amphetamines were found in the back pocket of his racing jersey. Additionally, the fact that Simpson's death was televised as part of the Tour de France resulted in even greater pressure on sports federations to ban doping and to develop methods of catching and preventing performance enhancement through chemistry. The IOC's Medical Commission developed a two pronged program which was designed to deter athletes from resorting to performance-enhancing drugs.<sup>39</sup> The first prong involved testing for drugs and punishing use of those drugs. The second prong was to educate athletes on the potential health risks associated with doping. By the 1968 Olympic Games in Mexico City, the IOC implemented a regime of preliminary drug-testing for stimulants in all events. This was also the first time that an athlete was disqualified for drug use. Hans-Gunnar Liljenvall, a member of the Swedish modern pentathlon team,<sup>40</sup>

---

<sup>34</sup>Buti & Fridman, *supra* at 31.

<sup>35</sup>*Id.*

<sup>36</sup>FIFA is the international governing body for soccer. Every four years, FIFA organizes and conducts the world's most popular sporting event – the World Cup.

<sup>37</sup><http://www.wada-ama.org/en/dynamic.ch2?pageCategory.id=312>.

<sup>38</sup>The Tour de France did not, and still does not, operate under the auspices of the IOC.

<sup>39</sup>Buti & Fridman, *supra* at 31.

<sup>40</sup>The modern pentathlon is an event which consists of five disciplines - épée fencing, pistol shooting, 200 m freestyle swimming,

was stripped of his bronze medal when his blood alcohol level tested higher than the allowable limit.<sup>41</sup> He reportedly had a couple beers prior to the event in order to calm his nerves. Eventually, the entire Swedish men's team had to forfeit its bronze medals.<sup>42</sup>

The anti-doping regime started to gain its current form in the 1970s. In 1971, the IOC Medical Commission released the first list of banned substances, which included stimulants and narcotic analgesics.<sup>43</sup> This is the predecessor to the Prohibited List that WADA issues every year, which lists every substance that would be grounds for disqualification if detected. By the next Olympics held in Munich in 1972, the IOC had executed the first comprehensive testing at the international competition level.<sup>44</sup> Rather than merely testing select athletes in every event, every single athlete was tested for banned substances. Anabolic steroids were finally outlawed by the 1976 Olympics in Montreal, when a reliable test to detect its use was developed. In those games, out of the 11 athletes disqualified for drug use, 8 of them were for steroid use.<sup>45</sup>

Despite the bans, the East German Olympic team was still able to use steroids and evade detection. In the 1970s, East Germany implemented a national plan, "State Plan 14.25," which provided top athletes with little blue pills, under the guise that they were vitamins, when in fact, they were the German-manufactured steroid, Oral Turinabol.<sup>46</sup> At the 1976 Olympic Games in Montreal, the East German women's swim team achieved unparalleled success by winning an amazing number of events, and was known as the "Wonder Girls" due to their dominance. However, they were pumped with such a massive amount of steroids that

---

a show jumping course on horseback, and a cross-country run. This is distinguished from the pentathlon held in Ancient Greece. In ancient times, the event included a short foot race, wrestling, the long jump, javelin, and discus throw. To confuse things even more, a track and field pentathlon was held in the earlier years of the modern Olympics. This version, a predecessor to the decathlon for men and heptathlon for women, included shot put, high jump, hurdles, sprint, and long jump.

<sup>41</sup>Buti & Fridman, *supra* at 31.

<sup>42</sup>The author finds it very ironic that the first Olympic disqualification for doping was actually inebriation. Alcohol is not usually the first substance that comes to mind when performance-enhancing drugs are mentioned. To be fair, however, limited amounts of alcohol have shown to improve accuracy in target-shooting disciplines, such as the modern pentathlon, archery, or the biathlon, which is held during the Winter Olympic Games.

<sup>43</sup>Buti & Fridman, *supra* at 31.

<sup>44</sup>*Id.*

<sup>45</sup>*Id.*

<sup>46</sup><http://www.dw-world.de/dw/article/0,2144,786574,00.html>

for many of them, their voices had dropped to a baritone and the androgenization of their bodies, including facial hair and a pronounced Adam's Apple, was apparent to everyone. When this national policy was finally exposed after the reunification of Germany in 1990, it was discovered that almost all of the East Germany's top athletes had ingested steroids under State Plan 14.25. The plan was so comprehensive that it included research and tests on the amount of time that athletes would test positive for performance-enhancing drugs. This enabled all the East German athletes to pass the recently implemented anti-doping regime in the 1976 Olympics, even though they had taken tremendous amounts of anabolic steroids.

The most famous Olympic doping scandal was the positive test of Ben Johnson, a Jamaican-born Canadian sprinter at the 1988 Olympic Games in Seoul, South Korea. As one of the world's fastest sprinters, he was such a celebrity in Canada that he was awarded the Order of Canada, Canada's highest civilian award, which is given to those who demonstrate the Order's motto of, "Desiring a better country." He was a fierce rival of Carl Lewis, one of the most decorated American track and field athletes. The two were constantly trading first and second place finishes in the 100 meter dash. There was tremendous build-up to the 1988 Olympics to determine who would win the showdown in the 100 meter dash, and thus be crowned the world's fastest man. Johnson ended up beating Lewis with a world-record time of 9.79 seconds. However, in post-race testing, Johnson's urine sample tested positive for stanozolol, a powerful anabolic steroid. He was subsequently stripped of his gold medal in the 100 meters, and the gold was awarded to his arch-nemesis, Carl Lewis.<sup>47</sup> The controversy that ensued led the Canadian government to establish the Commission of

---

<sup>47</sup>There is a tremendous amount of conspiracy and mystery surrounding the positive test. Johnson asserts that although he used performance-enhancing drugs, he did not take any stanozolol within the time frame that would show up positive on a test. Johnson insists that an associate of Carl Lewis sabotaged the urine sample, which led to the positive test. His associates steadfastly support Johnson's claim. Johnson's coach, Charlie Francis, went as far to write a book, *Speed Trap*, which admits that his athletes took anabolic steroids, but provides arguments why Johnson could not have legitimately tested for stanozolol. Furthermore, there was a lot of controversy over the final results of the race. The top three finishers, Johnson, Lewis (the eventual gold medal winner), and Linford Christie (the eventual silver medal winner), all tested positive for performance-enhancing substances at one point or another, but Johnson was the only one stripped of his medal and record. However, it can be noted that Johnson was the only one who tested positive in a medal-winning race.

Inquiry Into the Use of Drugs and Banned Practices Intended to Increase Athletic Performance, which was headed up by Ontario Appeal Court Chief Justice Charles Dubin. The Dubin Inquiry, as it is now known, lasted 91 days and involved testimony from 91 witnesses, including athletes, coaches, sports administrators, Olympic representatives, doctors, and government officials.

The precise procedures for testing for banned substances vary from sport to sport and organization to organization, but they all follow the same basic structure, which is still used to this day. When the athlete submits his urine and/or blood sample, the sample is identified only by a barcode or serial number in order to preserve the anonymity of the sample. There is always the fear that the more easily a sample can be identified, the more likely the integrity of the sample can be compromised, either by an employee handling the sample or the technician testing the sample or anyone else along the chain of custody. Before the sample is tested, it is split into an A-sample and a B-sample. First, the A-sample is tested by the lab. If the A-sample comes back negative, then the B-sample is discarded<sup>48</sup> and there is no further action taken, except perhaps a notification to the athlete that his/her sample passed the test. However, if the A-sample comes back positive, then the athlete and other sporting officials, such as representatives from the IOC and/or the governing sports federation, are notified. Then, they usually have the option of being present for the breaking of the seal on the B-sample and the subsequent testing. If the B-sample comes back positive (as it should, unless there was a testing error with the A-sample, or the A-sample was tampered with) then the athlete has officially tested positive, and the sport's anti-doping procedures are set into place.

---

<sup>48</sup>There is a movement in some sports, cycling in particular, to keep old samples so that they can test for drugs that are currently undetectable. There are two issues with such a regime. First, there is debate whether drugs, which are currently not banned but are later found to be performance-enhancing, should be tested for and serve as grounds for disqualification. While use of those drugs certainly violates the 'spirit of competition,' such a regime would probably create insurmountable notice problems that it could not be enacted. The second, more imminent, concern is that even if the samples are maintained solely for the purpose of testing drugs which are on the Prohibited List but presently cannot be reliably detected, some statute of limitations should be imposed so that athletes do not have the specter of disqualification looming over their records and legacies indefinitely.



Other than the Johnson controversy, there were few developments in the 1980s and early 1990s. There were changes in the types of drugs that were banned and minor tweaks in the testing procedures, but the overall regime remained relatively unchanged. The most significant development in the United States was that, as part of his War on Drugs program, President Reagan signed the Anti-Drug Abuse Act of 1988, which outlawed the sale of steroids for non-medical purposes. The most significant change on the international scene was the dramatic increase in the scope of drugs that were being banned. The IOC Medical Commission began to ban drugs, which were not, in and of themselves, ergogenic aids. Rather, these drugs, known as masking agents, had the ability to interfere with the accurate detection of performance enhancing drugs. For example, diuretics work by stimulating urine production by the kidneys, which can lead to a lowered concentration of the banned substances in the urine. If it is sufficiently diluted, the tests will not be able to detect the remaining trace amounts of the banned substance.<sup>49</sup> Thus, these drugs, and others like it, are on the banned substances list, even though they themselves are not performance-enhancing.<sup>50</sup> The next big revolution in the international anti-doping scene was the 1998 Tour de France, one of the most significant, far-reaching scandals to impact an entire sport in recent history.

### *Doping in the Tour de France*

On July 8, 1998, a scandal erupted in the Tour de France when French customs officials arrested Willy Voet, a soigneur<sup>51</sup> for the Festina cycling team, for possession of various illegal prescription drugs, including narcotics, erythropoietin (EPO), growth hormones, testosterone, and amphetamines. As a result of that discovery, two weeks later, French police raided the hotel rooms of several top cycling teams and found

---

<sup>49</sup>Yet another reason for banning diuretics is their value in helping athletes who compete in events divided by weight class, such as wrestling and boxing. Diuretics can artificially lower an athlete's body weight by forcing the body to retain a less-than-normal amount of water. Since the body is made up of approximately 60% water, even a small reduction in water retention can make a measurable difference in total body weight.

<sup>50</sup>This leads one to wonder whether there are masking agents that prevent detection of masking agents, and whether they are on the banned substances list. The author has done some research on this topic, but was not able to find anything.

<sup>51</sup>A soigneur (swan-YOOR) is a team assistant that looks after the riders' needs around the clock. He will provide massages, transport luggage from one site to the next, wash laundry, and prepare meals. One soigneur for the legendary United States Postal Service team, which Lance Armstrong rode for, was team chef Willy Balmat, who would always have massive breakfasts ready for the team each morning. (From: <http://www.usatoday.com/sports/cycling/2002tour/2002-07-15-usat-soigneurs.htm>).

copious amounts of doping products in the possession of the TVM team. When riders learned that the French police were threatening additional police action, they staged a “sit-down strike” on the seventeenth stage by refusing to continue, in order to protest, what they felt to be, heavy-handed actions by the French police. It was only after mediation by Jean-Marie Leblanc, the Director of the Tour de France, that the riders agreed to proceed and finish with the race. However, by that point, only 15 of the initial 21 teams that started the race were still participating, because many teams, including all four of the Spanish teams, had dropped out as a form of protest. Some refer to the 1998 Tour de France as the “Tour of Shame.”<sup>52</sup>

This scandal attracted international attention and highlighted the need for an independent international agency that could create and enforce a uniform standard for the definition of, and testing for, doping that would preside across most, if not all, international sports. Up to that point, anti-doping was governed in a piecemeal fashion. Different sports, sports federations, governments, and the IOC all had their own versions of what drugs were banned, what testing procedures would be followed, and what the process for sanctions would be. In 1998, the IOC took up this challenge by initiating and convening the World Conference on Doping in Sport in Lausanne, Switzerland.<sup>53</sup> Representatives from various sporting federations gathered to discuss and debate the issues surrounding performance-enhancing drugs. Following a proposal that was reached at the conference, the World Anti-Doping Agency (WADA) was established on November 10, 1999 to organize and execute the anti-doping efforts across countries and across sports. While WADA was set up by the IOC’s initiative, it is not an organization that is governed by, or operates under, the auspices of the IOC. Rather, it is a private, non-governmental organization which draws support from a diverse range of both sporting and non-sporting organizations.

One issue that WADA faced when initially trying to implement a wide-ranging anti-doping policy was that many governments could not be legally bound by non-governmental documents such as WADA’s World

---

<sup>52</sup>Peter Ford, *Armstrong races for Tour record, drug charges in pursuit*, Christian Science Monitor, July 2, 2004.

<sup>53</sup><http://www.wada-ama.org/en/dynamic.ch2?pageCategory.id=312>.

Anti-doping Code, which sets out the definitions and standards for anti-doping.<sup>54</sup> It also includes an annual Prohibited Substances List, which names all the substances that are banned. WADA took two steps to achieve broad acceptance and compliance by the vast majority of countries. First, WADA drafted an International Convention under the auspices of UNESCO, the United Nations entity that oversees education, sciences, and culture, so that countries could formally accept the terms of the World Anti-doping Code.<sup>55</sup> This effort culminated in the unanimous adoption of the International Convention against Doping in Sport at the 33<sup>rd</sup> UNESCO General Conference on October 19, 2005.<sup>56</sup> The other step that WADA took to encourage implementation and enforcement of the World Anti-doping Code was the Copenhagen Declaration, a political document that allowed states to affirm their objectives to officially recognize, initiate, and carry out the World Anti-doping Code.<sup>57</sup> As of the date of this paper, 184 countries (including the United States) have already committed to the Copenhagen Declaration, and they are all expected to ratify the UNESCO International Convention against Doping in Sport.

### *Doping in Baseball*

Out of all the major sports in America, Major League Baseball has received the most scrutiny for its role, or lack of a role, in the anti-doping process. Baseball has had a long history of using performance-enhancing drugs. Drugs, such as speed, were introduced in the 1960s to help players recover from the fatigue and aches and pains that players developed. Some clubhouses supplied “uppers” in widely-accessible candy jars as recently as the 1980s.<sup>58</sup> Steroid use can be confirmed as early as the mid-1980s, with players such as Jose Canseco and Mark McGwire, a.k.a. the Bash Brothers, taking steroids to improve their performance.<sup>59</sup> However, despite increasing usage in the league, the public only heard occasional rumblings and dark rumors

---

<sup>54</sup>The World Anti-doping Code is discussed more comprehensively in a previous section, Definition of Doping.

<sup>55</sup><http://www.wada-ama.org/en/dynamic.ch2?pageCategory.id=251>.

<sup>56</sup>*Id.*

<sup>57</sup>*Id.*

<sup>58</sup>Shaun Assel & Peter Keating, *Who Knew?*, ESPN The Magazine, November 21, 2005, at 71.

<sup>59</sup>*Id.* at 72.

of doping in the league. There is still wide debate as to who knew about the use of steroids, and whether there was a purposeful blind-eye turned by the players, managers, executives, and media. Regardless, the general, baseball-watching public was kept in the dark about any serious suspicions of steroid use in baseball. However, the doping issue was apparently widely-enough known that on June 7, 1991, then-Commissioner Fay Vincent sent out a memo to each team and the players union which prohibited the possession, sale, or use of any illegal drugs, including steroids.<sup>60</sup> The memo did not mention testing, which had to be worked out with the players' union, but it did set out treatment and penalty guidelines.

Over the next 10 years, baseball players on steroids went on to accomplish amazing feats. Ken Caminiti confessed to playing his 1996, National League MVP-winning year, on steroids. In 1998, during the height of the McGwire-Sosa chase of the single-season home-run record, McGwire admitted to taking the dietary supplement androstenedione, after it was discovered in his locker.<sup>61</sup> While there was a temporary public outcry, the story died quickly as the chase for Maris' single-season homerun record heated up and captured the nation's imagination.

According to *Game of Shadows: Barry Bonds, BALCO, and the Steroids Scandal that Rocked Professional Sports*, it was during the nation's infatuation with the McGwire-Sosa chase that drove Barry Bonds to succumb to the temptation of taking performance-enhancing drugs. He considered himself the best complete player in baseball, yet he was not getting nearly the attention that McGwire and Sosa, players he considered to be inferior talents, were receiving, and he attributed it entirely to their taking steroids.<sup>62</sup> Over the next few years, Barry Bonds went on an unprecedented offensive barrage, including setting a new single-season

---

<sup>60</sup>*Id.*

<sup>61</sup>Androstenedione, or andro as it is often known, is a steroid-precursor, which means that while it is not technically a steroid, once it is ingested, it functions almost identically to anabolic steroids. While this substance was not banned in baseball at the time, it was banned by the NFL, NCAA, and the Olympics.

<sup>62</sup>Mark Fainaru-Wada & Lance Williams, *Game of Shadows: Barry Bonds, BALCO, and the Steroids Scandal that Rocked Professional Sports* (Gotham 2006).

home run record of 73 home runs, and winning four consecutive MVPs from 2001 to 2004. Previously, the highest number of MVPs that anyone had ever earned *in an entire career* was three. With these additional four MVPs, Bonds shattered that record with a total of seven career MVPs. During this offensive reign, rumors of steroid use and other doping flared occasionally, but without any testing or any other confirmation, the rumors quickly died out.

After years of dragging its feet, Major League Baseball finally started to take public action against doping when it unilaterally prohibited performance-enhancing drugs and instituted in-season testing for minor league players starting in 2001. The league was able to do this because minor leaguers were not covered by the players' union and the collective bargaining agreement, so the league had much more unilateral authority. The results were alarming – more than 10% of minor leaguers tested positive for performance-enhancing drugs.<sup>63</sup> During the 2002 season, as the players' union and the owners negotiated a collective bargaining agreement, the players' union, feeling pressure from the public, media, and within its own ranks, finally agreed to a preliminary testing scheme, which would include a season of survey testing before instituting punishments. During the 2003 season, anonymous testing would commence, and if more than 5% of tests came back positive, then the following season, the 2004 season, would operate with penalties for positive tests. If less than 2.5% tested positive for two consecutive years, then there would be no future steroids testing.

Up until the 2003 season, the only prohibition against doping was the memo first issued by then-commissioner Fay Vincent, and then followed up years later by current-commissioner Bud Selig. However, this memo was not backed-up with any testing, which had to be negotiated with the players' union, so it was essentially a bare, toothless declaration. Additionally, many officials of the players' union argued that not only did testing have to be negotiated, but the ban itself as well, so the memo was invalid. Thus, for all intents and purposes,

---

<sup>63</sup> Assel & Keating, *supra* at 81-82.

Major League Baseball did not have any restrictions or prohibitions on the use of performance-enhancing drugs until the agreement reached in 2002.

At the conclusion of the 2003 season, Major League Baseball confirmed that between 5-7% of the drug tests had come back positive. The only surprise was that the numbers were not higher, especially when former baseball players, such as Jose Canseco and Ken Caminiti, argued that over half of all Major League players were abusing performance enhancing drugs. However, one must keep in mind that there might have been two factors that might have accounted for what seems to be a low rate of positive tests. First, all these tests were conducted in-season, and because the players knew that the tests were coming, they could have cycled off the drugs in time to test negative. However, the player would have still reaped the benefits of using the drugs, such as increased strength, stamina, etc., for a considerable amount of time after he was stopped taking them.<sup>64</sup> It is true that the tests were anonymous and individually, the players would lose nothing if they tested positive, but they could never be sure when an anonymous test could be leaked and associated with a player. This potential revelation and association with “cheating” might have been sufficient motivation for some number of baseball players to either cycle off of steroids in time to test negative, or cease usage of performance-enhancing drugs completely. Another possible explanation for the lower-than-expected rate of positive tests is that many baseball players could have used steroids that were undetectable at the time. The detection of steroids has always been a cat-and-mouse game, and baseball was no different. Many baseball players could have used steroids that were undetectable at the time, thanks to the help of people like Victor Conte.

Victor Conte was the founder of the Bay Area Laboratory Co-Operative, or BALCO as it has come to be known. The official business of BALCO was to provide athletes with legal dietary supplements and nutrients,

---

<sup>64</sup>This is the fundamental principle that requires any comprehensive and effective anti-doping policy to include random, off-season testing, as well as in-competition, or in-season, testing. Athletes can use the drugs regularly before the competition, but then cycle off the drugs as the competition approaches such that they will test negative for that performance-enhancing drug, but they will still retain the strength, stamina, and other ergogenic benefits during the course of the competition.

which would lead to improved athletic performance. In fact, one of BALCO's most popular services involved analyzing an athlete's blood sample for nutrient deficiencies, and then customizing a supplement which would correct those deficiencies. However, in the summer of 2003, a raid on BALCO's facilities by federal agents exposed BALCO's far more successful and notorious underground activities. Victor Conte created designer steroids which were so new that they were undetectable by drug testing. The most notable of these steroids were "the cream," a topical solution, and "the clear," a liquid administered orally. Evidence found during the raid on BALCO's facilities implicated many famous athletes, both inside and outside of baseball. These athletes included Olympians, such as Tim Montgomery (the world record holder in the 100m sprint at the time) and Marion Jones, football players, such as Bill Romanowski, and baseball stars, such as Barry Bonds, Jason Giambi, and Gary Sheffield.

Regardless of the lower-than-expected rate of positive tests in the 2003 season, more than 5% tested positive and thus, the enforcement and punishment component of steroids testing was triggered. Starting with the 2004 season, the penalty structure was such:

- First offense: treatment
- Second offense: 15 day suspension or up to \$10,000 fine
- Third offense: 25 day suspension or up to \$25,000 fine
- Fourth offense: 50 day suspension or up to \$50,000 fine
- Fifth offense: one year suspension or up to \$100,000

All suspensions were to be without pay and all the testing was conducted in-season. This penalty structure was extremely mild, especially considering that players would only be tested once per season. Thus, under this structure, a player could use steroids for five years before finally reaching his fifth offense and getting suspended for a year. In the 2004 season, no one was suspended for using steroids. Considering that Major League Baseball had no steroids testing or penalties previously, however, this was a step in the right direction.

This newly instituted drug policy only lasted a single season. After the end of the 2004 seasons, Major League Baseball owners and players were able to agree to a harsher set of penalties that were to kick in for the 2005 season. These new penalties were, at least partially, prompted by the raid on Victor Conte's BALCO facilities and the ensuing public scrutiny in 2003. The new penalty structure was such:

- First offense: Up to 10 day suspension
- Second offense: 30 day suspension
- Third offense: 60 day suspension
- Fourth offense: 1 year suspension
- Fifth offense: Penalty at the commissioner's discretion

Additionally, under the new rules, players were to be tested a minimum of once per year, but there was the possibility for players to be tested numerous times a year. Unlike the previous season, numerous baseball



players tested positive in 2005 and served the 10 day punishment; the most famous of these players was Rafael Palmeiro, a potential Hall of Fame first baseman.

Apparently, these new rules were not stringent enough for Congress, which launched a series of hearings into steroids use in baseball.<sup>65</sup> It invited several present and past baseball stars to testify, including Mark McGwire, Sammy Sosa, Curt Schilling, and Rafael Palmeiro. Congress had multiple proposals for legislation that would mandate the testing of professional athletes and remove any bargaining power or discretion from the hands of individual leagues, its executives, and its players' unions.<sup>66</sup> One proposal, named the Drug Free Sports Act, would create a federal drug testing policy under the auspices of the Secretary of Commerce and would govern the professional sports in the United States. It would require at least two tests per athlete per year, and penalty for the first offense would be a two-year ban, while a second offense would mandate a lifetime ban.<sup>67</sup> Another proposal was the Clean Sports Act of 2005, which was the same as the Drug Free Sports Act, except it mandated at least five tests per year, and put control of the program under the Director of the White House Office of National Drug Control Policy.<sup>68</sup>

This threat loomed sufficiently large that Major League Baseball owners and the players were able to agree to stiffen the penalties once again, after the 2005 season. The new structure that had been implemented for the 2005 season was completely overhauled, which meant that there were three consecutive seasons (2004, 2005, 2006) where the penalties for steroid use changed dramatically from year to year. The new (and current) penalty structure is as follows:

---

<sup>65</sup>Dave Sheinin, *Baseball Has A Day of Reckoning In Congress*, Washington Post, March 18, 2005, at A01.

<sup>66</sup>Kathy Kiely, *McCain plans to ask leagues about testing*, USA Today, September 9, 2005, at 4C.

<sup>67</sup><http://olpa.od.nih.gov/legislation/109/pendinglegislation/drugsports.asp>.

<sup>68</sup>*Id.*

- 

First offense: 50 game suspension

- Second offense: 100 game suspension

- Third offense: Lifetime ban

This new structure required much harsher penalties for use of steroids. Additionally, the new agreement established mandatory random testing for amphetamines for the first time. This was a revolutionary advancement, because according to some baseball players, the use of amphetamines is an even more widespread and significant problem than steroids.<sup>69</sup> The new policy is not as severe as some of the proposals in Congress, but it seems to be sufficiently stringent, for the time being anyway, as at the writing of this paper Congress has not taken any further action to advance its proposals into law.

By comparison, the National Football League's steroid policy is as follows:

- 

First offense: four game suspension

- Second offense: six game suspension

- Third offense: minimum one year suspension

---

<sup>69</sup>Assel & Keating, *supra* at 83.

The testing is conducted year round, including during the off-season and every player is tested. In light of baseball's new policy, the NFL's policy does not look as stringent and there have been a few calls for harsher penalties. As an aside, the NFL treats recreational drugs very differently from steroids. In testing for recreational drugs, the league gives players a specified date and plenty of advance warning. Even if the player tests positive, he must test positive a second time before he is suspended. The league treats recreational drug use as a medical issue, and completely separate from the use of performance-enhancing drugs.

The NFL's steroid policy, which often has been praised as effective and comprehensive,<sup>70</sup> traces back to the late 1980s, about 15 years before baseball implemented its own steroid policy. This can be attributed to two factors. First, steroids were widespread much earlier in football than in baseball. According to some accounts, as many as half the players in the league used steroids in the late 70s and early 80s.<sup>71</sup> It is generally accepted that widespread steroid use did not occur in baseball until the late 1980s, at the earliest.<sup>72</sup> This gave the NFL a head start on confronting the issue of steroid use among its ranks. This leads to the second factor for the much-earlier implementation – the NFL's willingness to confront the problem directly. The then-NFL commissioner, Pete Rozelle, and the NFL Player's Union were willing to deal with the problem rather than overlooking it, which is what the MLB is accused of doing. The NFL's current commissioner, Paul Tagliabue, and the Players Association Executive Director Gene Upshaw have continued to demonstrate a strong willingness to address the steroid issue. These are the reasons why the NFL was able to implement a steroid policy a decade and a half before Major League Baseball.

The National Basketball Association, in charge of the third major sport in the United States, tests rookies up to four times that season, but afterwards, veterans are only tested once, during training camp. The penalties range anywhere from game suspensions to lifetime bans. Steroid use is not as significant of an issue

---

<sup>70</sup>Marty Meehan, *NFL is a model for cracking down on steroids*, The Hill, April 27, 2005.

<sup>71</sup>Associated Press, *Haslett Says He Used Steroids as Player for Year*, New York Times, March 25, 2005, at D8.

<sup>72</sup>Assel & Keating, *supra* at 71.

in the NBA since the resulting added muscle mass and bulk would actually lead to impaired performance.

Compared to the other sports, baseball's new policy is among the most stringent. While baseball was one of the last sports to finally adopt an anti-steroid policy, it seems that in a short time, with some pressure from Congress and the public, it has come to lead the charge against the use of performance-enhancing drugs.

### **Health Effects of Doping**

Just as there are a myriad of different performance enhancing drugs, there are also a myriad of diverse health effects that can stem from the use of those drugs. Since a comprehensive examination of all the effects of all known performance-enhancing drugs would result in an encyclopedic volume, this paper will focus on the health effects of three different types of performance-enhancing drugs/methods: anabolic steroids, blood doping, and human growth hormone. These were selected due to their distinct differences in their effects as ergogenic aids and their potential adverse side-effects.

#### *Anabolic Steroids*

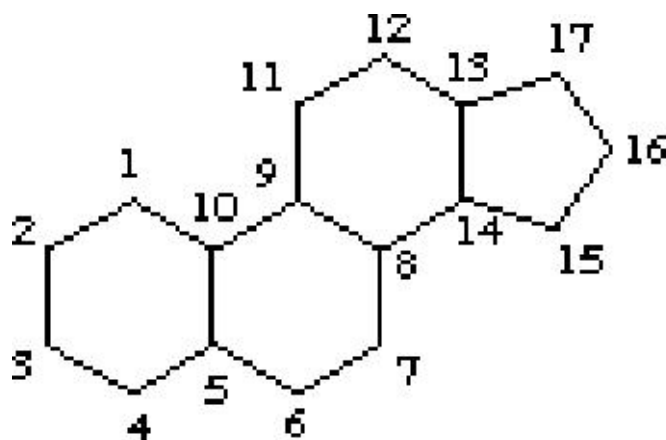
In general, steroids are a very broad and varied group of drugs. The technical definition of a steroid is "any of a class of natural or synthetic organic chemical compounds characterized by a molecular structure of 17 carbon atoms arranged in four rings." The generic form of a steroid can be diagrammed as such:

73

Diagram found at: <http://www.chemcool.com/definition/steroids.html>.

---

73



However, that is only the base of the steroid. Additional bonds can be added on, such that they are different molecules, yet still do substantially similar things. As long it has the basic foundation of 17 carbon atoms fused together to form four rings, an infinite number of additional bonds can be added. At some point, it does not even look like they belong in the same classification, yet they are. The following is an example of such a steroid:

74

Diagram found at: <http://en.wikipedia.org/wiki/Image:Steroid-nomenclature.png>.

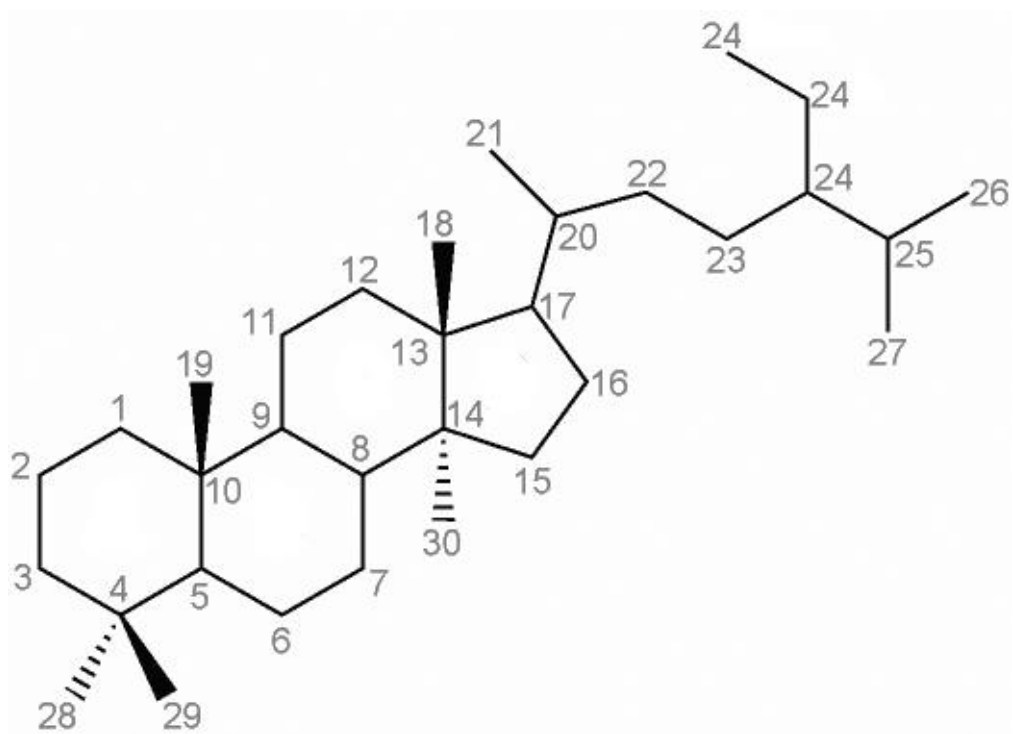
This is how so-called “designer steroids,” such as the ones found in the BALCO scandal,<sup>75</sup> were created.

In the human body, steroids are hormones responsible for regulating certain substances from the adrenal

---

<sup>74</sup>

<sup>75</sup>See previous discussion in History of Doping & Anti-Doping Efforts: Doping in Baseball.



cortex. Thus, steroids are very powerful chemicals that can provide many benefits, as well as detriments, to human health. One well-known beneficial use of steroids is in asthma inhalers, which act by preventing inflammation of certain airways. Flovent and Advair, two popular medications often advertised on television and in print, are examples of asthma inhalers that contain steroids.<sup>76</sup>

On the other hand, anabolic steroids, or anabolic-androgenic steroids to be more exact,<sup>77</sup> are essentially synthetic testosterone hormones that produce the benefits, as well as side-effects, that the athletes are looking for. The term ‘anabolic’ refers to the hormone’s ability to build up organs and tissues, which in this case tends to be the muscles that the athletes are trying to develop. The term ‘androgenic,’ which is often left out for convenience and perhaps also to downplay the side-effects, refers to the drug’s effect on the male sex organs, as well as development of the male secondary sex characteristics.

Before delving into the many potential negative side effects that accompany use of anabolic steroids, it is useful to detail the positive aspects, which include many of the reasons that athletes ingest the drug. First, and foremost, anabolic steroids increase protein synthesis.<sup>78</sup> The repeated use of a specific muscle group, such as through lifting weights, is the stimulus for protein synthesis which develops increased skeletal muscle mass above the body’s maintenance level. Normally, the body has a maximum rate at which it can convert protein into skeletal muscle. This rate is generally reflected by the recommended daily allowance (RDA) of 1 gram of protein for every kilogram of body weight. Of course there are slight differences based on individual differences and different physical activities, but much larger amounts of protein will be turned into carbohydrate storage, as well as body fat.<sup>79</sup> However, with the use of anabolic steroids, the body can convert 50% more protein into muscle mass due to the increase in protein synthesis. The body would then

---

<sup>76</sup><http://rss.cnn.com/HEALTH/library/HQ/01081.html>.

<sup>77</sup>In medical journals, anabolic steroids will often be referred to as anabolic-androgenic steroids, or the acronym AAS.

<sup>78</sup>William N. Taylor, M.D., *Anabolic Steroids and the Athlete* 30, (McFarland & Company Inc., Publishers 2002).

<sup>79</sup>*Id.* at 29.

be able to use 1.5 grams of protein per kilogram of body weight, before the excess protein was converted into other energy forms.<sup>80</sup> An interesting result from this process is that, using anabolic steroids alone, or even combined with a regular workout regime, is likely insufficient for building much more muscle mass if the athlete does not also intake an increased level of protein. 1.5 grams of protein per kilogram of body weight per day is not an insignificant amount. To put some perspective on it, a 175 lbs. man would have to eat approximately 3 whole chicken breasts or more than a pint of peanut butter,<sup>81</sup> in order to achieve that intake. Fortunately, another side effect of anabolic steroids is increased appetite. This combination of muscle creation along with stimulation of appetite has prompted doctors and researchers to use anabolic steroids as part of the treatment for AIDS and cancer patients. Use of anabolic steroids helps the patients maintain their appetites as well as minimize the muscle wasting that is common with those diseases.

The other primary benefit from anabolic steroid use that athletes seek is the reduction in recovery time due to the drug's ability to block the effects of cortisol, a stress hormone, on muscle tissue. The end result is that the effect of catabolism, or the breakdown of molecules into smaller units, will be lessened on the muscle tissue that the user is trying to build.<sup>82</sup> Additional benefits of anabolic steroids include increased bone remodeling and growth and stimulation of bone marrow, which leads to the increased production of red blood cells. Users have also reported that they can recover more quickly from workouts and can train more intensively and frequently with the use of steroids, but the placebo effect has not been discounted as the basis for those claims.<sup>83</sup>

As for the many adverse effects of anabolic steroid use, one comprehensive list attempts to summarize the adverse effects that have been discovered and/or associated with anabolic steroid use:<sup>84</sup>

---

<sup>80</sup>*Id.* at 30.

<sup>81</sup>To put it in the context of the writer's, and supervisor Professor Peter Hutt's, favorite food, that same 175 lbs. man would have to eat approximately one gallon of ice cream in order to reach that intake level of 1.5 grams for every kilogram of body weight.

<sup>82</sup>C. Maravelias et al., *Adverse effects of anabolic steroids in athletes – A constant threat*, 158 *Toxicology Letters* 169 (2005).

<sup>83</sup>*Id.*

<sup>84</sup>*Id.* at 170.



Liver:

Hepatocellular damage<sup>85</sup>

Peliosis hepatitis<sup>87</sup>

Hepatocarcinoma<sup>89</sup>

Cholestasis<sup>86</sup>

Hepatoadenoma<sup>88</sup>

Cardiovascular and hematologic effects:<sup>90</sup>

Increased overall cholesterol

Hypertension

Decreased HDL cholesterol<sup>91</sup>

Thrombosis<sup>92</sup>

Musculoskeletal:

Increased rate of muscle strains/ruptures

Early epiphyseal closure<sup>93</sup> in children

Increased risk of musckulotendinous<sup>94</sup>

Endocrine (other than reproductive):

Decreased glucose tolerance<sup>95</sup>

Larynx:

Deepening of the voice

Integument<sup>96</sup>:

Acne

Hirsutism<sup>98</sup>

Edema<sup>99</sup>

Alopecia<sup>97</sup>

Male pattern baldness

Urinary:

Elevated BUN<sup>100</sup>, creatinine<sup>101</sup>

Wilm's tumor<sup>102</sup>

---

<sup>85</sup>Damage to the liver cells

<sup>86</sup>Blockage of bile secretion, which leads to inhibited digestion

<sup>87</sup>Inflammation of the liver

<sup>88</sup>Cancer of the glandular liver cells

<sup>89</sup>Cancer of the epithelial liver cells

<sup>90</sup>Effects on the heart, blood, and blood vessel system

<sup>91</sup>HDL cholesterol is the "good" cholesterol, such that high levels are desirable, while LDL is the "bad" cholesterol, such that lower levels are desired

<sup>92</sup>Blood clots, which can lead to diseases such as heart attacks and strokes

<sup>95</sup>Increased risk of diabetes

<sup>96</sup>The system of skin and hair on the body

<sup>97</sup>Loss of hair, which can occur to both men and women.

<sup>98</sup>Excessive growth, or abnormal distribution, of hair

<sup>99</sup>Increased water retention within the skin, a sign of disease

<sup>100</sup>BUN stands for Blood Urea Nitrogen, a type of bodily waste, and elevated levels of BUN are usually an indicator of kidney function failure.

<sup>101</sup>Another type of bodily waste, similar to BUN

<sup>102</sup>A type of kidney malignancy

Immunologic and Infectious effects:  
Hepatitis B or C; HIV infection<sup>103</sup>      Decreased IgA levels<sup>104</sup>

Reproductive:

<u>Male</u>	<u>Female</u>
Decreased reproductive hormones	Menstrual irregularities
Testicular atrophy <sup>105</sup>	Clitoral hypertrophy <sup>106</sup>
Oligospermia <sup>107</sup> /azoospermia <sup>108</sup>	Uterine atrophy <sup>109</sup>
Impotence	Breast atrophy
Prostatic hypertrophy <sup>110</sup>	Teratogenicity <sup>111</sup>
Prostatic carcinoma <sup>112</sup>	
Gynecomastia <sup>113</sup>	
Priapism <sup>114</sup>	

Psychologic  
Mood swings      Aggressive behavior  
Depression      Psychosis  
Withdrawal and Dependency Disorders      Addiction

This list reveals the overwhelming diseases and other adverse effects that have been associated with steroid use, but closer examination of the diseases on the list seem to reveal an utterly baffling phenomenon: steroid use can seem to have completely opposite effects on the human body. For example, on the skin, it has been

---

<sup>103</sup>The risk of viral infection, such as HIV or hepatitis, can arise from two sources. First, one popular method of administering anabolic steroids used to be through deep intra-muscular injections via syringes. By sharing and reusing those syringes, the users will run the risk of transmitting infectious, blood-borne diseases. However, more recent forms of steroids have been administrable orally, in the form of liquid drops, or topically, in the form of a cream or oil, which practically eliminates this risk. The second possibility, which still exists, is through the effects of immuno-suppression. Anabolic steroids have been linked to negative effects on the overall immune system. The result is that while a healthy immune system can fight off infection after exposure, a suppressed immune system is less able to fight an exposure, which leads to infection.

<sup>104</sup>IgA stands for Immunoglobulin class A, a type of antibodies, which are an essential part of the immune system

<sup>105</sup>Shrinkage of the testicles

<sup>106</sup>Enlarged clitoris to the point of appearing similar to a small penis

<sup>107</sup>Low sperm count

<sup>108</sup>Practically nonexistent sperm count, or completely unviable sperm cells

<sup>109</sup>Shrinkage of the uterus

<sup>110</sup>Enlarged prostate, which inhibits the ability to urinate

<sup>111</sup>Increased likelihood of producing abnormal fetuses, which leads to birth defects

<sup>112</sup>Prostate cancer

<sup>113</sup>Formation of large breasts on the male body

<sup>114</sup>Prolonged erections, which can cause necrosis of the penis due to blocked circulation

associated with both baldness (alopecia) and hirsutism, or excessive hair. Another example is the converse effects it has on the male versus female reproductive system. In males, it seems to decrease their male traits, with effects like testicular atrophy or priapism, but in females, it seems to increase masculine traits, with effects such as deepening of the voice, breast atrophy, and clitoral hypertrophy. Two issues provide insight into these bizarre contradictions. First, the simple answer is that the endocrine system, the system of the body that regulates hormone production and the system that anabolic steroids try to short-circuit, is an extremely complex process which is still not completely understood, so it is not surprising to learn that we do not know why steroids cause one effect in one person, yet a completely different effect in another person.

The other issue is that this comprehensive list of adverse effects is subject to a powerful disclaimer. Unlike most other drugs available for human consumption, anabolic steroids have undergone limited clinical studies. Placebo-controlled clinical studies are not feasible due to the ethical constraints of administering anabolic steroids in a non-therapeutic setting, so the only clinical trials that have been conducted have been in clinical-therapeutic trials, such as the treatments discussed above for AIDS and cancer patients. Thus, the data for healthy humans is less than scientific, which means that the above list has not been scientifically tested and supported. This leaves open the possibility that small amounts of anabolic steroids have no, or minimal, negative side effects, a stance supported by some.<sup>115</sup> They point out that most of the knowledge of the adverse effects of anabolic steroids come from two sources: first, the limited clinical-therapeutic trials, where the subjects are usually very sick and in the last stages of life, and second, anecdotal evidence from the non-clinical user, such as an athlete, who takes anabolic steroids without medical assistance and usually in massive quantities. These two groups are not necessarily the best samples to demonstrate the adverse

---

<sup>115</sup>Angela J. Schneider & Robert B. Butcher, *A philosophical overview of the argument on banning doping in sport*, in *Values in Sport: elitism, nationalism, gender equality and the scientific manufacture of winners* 188 (Torbjörn Tännsjö & Claudio Tamburrini eds. 2000).

effects of anabolic steroid use in the average person. After all, even widely-accepted and ingested substances, such as Vitamin E or iron, can have significant adverse side-effects if taken in enormous quantities. The dosages of these drugs that world-class athletes ingest, without medical supervision, is usually many times the recommended medical dosage. In fact, the level is so high that under “current federal regulations governing human subjects. . . no institutional review board would approve a research design that entailed giving subjects anywhere near the levels. . . used by the athletes.”<sup>116</sup> There have been a very few scientific studies which administered low doses of anabolic steroids to healthy participants in order to determine the side effects. This is at least partially due to the steroids ban, and the accompanying stigma of steroids, that currently exists. It is somewhat ironic that one of the factors that prevents a solid, scientific conclusion on the adverse effects of small doses of steroids in a healthy body, is the general policy and ban towards steroids.

### *Blood Doping*

In the human body, red blood cells make up the majority of all blood cells. They are the vehicles by which oxygen is delivered to body tissue, and they also transport carbon dioxide, a cellular waste, away from the tissue. The more red blood cells a body contains, the less the body will get fatigued, since the muscle tissues are getting replenished with fuel (i.e., oxygen) at a quicker rate. For endurance athletes, such as marathoners, cyclists, and swimmers, this ability to delay the onset of fatigue and exhaustion is of critical importance since, unlike other athletes, such as football players or skiers, they are not able to rest or “catch their breath” frequently. The benefits of greater red blood cells are scientifically proven, which encourages endurance athletes to engage in blood-doping, which is the process of boosting their red blood cell level through artificial means.

There are three main methods of blood-doping, all of which present their own problems. Blood-doping can

---

<sup>116</sup>Robert L. Simon, *Good Competition and Drug-Enhanced Performance*, in *Sports Ethics: an Anthology* 175 (Jan Boxill ed. 2003) quoting Thomas H. Murray, *The Coercive Power of Drugs in Sports*, in *The Hastings Center Report*, 13, 26 (1983).

be performed through autologous as well as homologous blood transfusion. In autologous transfusion, the doer will harvest his own red blood cells by drawing blood two to three months before the competition, which then induces the body to naturally replace the lost blood (and red blood cells) by creating more. By the date of the competition, the body will have completely replaced the blood that was removed. The athlete then re-introduces the withdrawn red blood cells to his body, leading to a higher-than-normal red blood cell level during the competition, which provides the benefits discussed above. The problems associated with blood doping include blood clots, overload of circulatory system,<sup>117</sup> heart attack, and stroke.<sup>118</sup> Additionally, there is the risk that the blood was improperly stored during the interim, which can lead to blood poisoning and other problems.

In homologous transfusion, the red blood cells are taken from a compatible donor and then transfused into the athlete. Along with the problems associated with autologous transfusion, homologous transfusion has the additional risk of transmission of infectious disease,<sup>119</sup> a possibility whenever blood is exchanged. To be fair, the risks of blood-doping are not universally accepted. Some argue that blood doping, especially the autologous variety, and when properly administered, poses absolutely no health risks.<sup>120</sup>

The third method of blood doping is not technically blood doping at all, since it is a drug, but it falls under this category since it achieves the same effects as autologous and homologous blood transfusions. Erythropoietin, or EPO as it is more commonly known, is a synthetic hormone that stimulates the production of red blood cells. The net result is the same as transfusing blood into the athlete's body – the athlete will have more red blood cells and thus a greater oxygen-carrying capacity. EPO does not come with any dangers that are significantly different from blood doping through regular blood infusion, but there is a much greater chance of heart failure. As the concentration of red blood cells increases in the blood, the blood becomes

---

<sup>117</sup>[http://news.bbc.co.uk/1/hi/health/medical\\_notes/3559882.stm](http://news.bbc.co.uk/1/hi/health/medical_notes/3559882.stm).

<sup>118</sup><http://www.theathlete.org/wada.htm>.

<sup>119</sup>[http://news.bbc.co.uk/1/hi/health/medical\\_notes/3559882.stm](http://news.bbc.co.uk/1/hi/health/medical_notes/3559882.stm).

<sup>120</sup>Claudio M. Tamburrini, *What's wrong with doping?* in *Values in Sport: elitism, nationalism, gender equality and the scientific manufacture of winners 201* (Torbjörn Tännsjö & Claudio Tamburrini eds. 2000).

thicker and more viscous. When the heart rate drops to low levels, such as during sleep, the heart has a harder time pumping the thicker blood, which can result in heart failure. The causes of death for 18 Belgian and Dutch cyclists, between 1987 and 1990, have never been fully explained, and there is rampant speculation that it is, at least partially, attributable to their extremely elevated concentrations of red blood cells, especially since many of them died from heart failure in their sleep.<sup>121</sup> While this danger exists in normal blood infusion, the risk is escalated with EPO because it is much easier to take mega-doses of EPO than it is to infuse gallons of red blood cells into the body.

### *Human Growth Hormone*

Growth hormone, a hormone naturally secreted by the anterior pituitary gland, stimulates the growth and cell production of humans, as well as other vertebrates. There are rare cases where the pituitary gland produces too much growth hormone,<sup>122</sup> which leads to acromegaly<sup>123</sup> and pituitary gigantism.<sup>124</sup> However, the more common disease is growth hormone deficiency, where the person's body produces too little of the hormone. This condition can cause growth failure (such as short stature) and hypoglycemia, the pathologic state of lower than normal levels of glucose (sugar) in the blood. Treatment for this condition usually involves the injection of human growth hormone and is generally able to effect dramatic improvements in the patient's life. In adults, as the body ages, the body produces less growth hormone, which might, or might not, be a partial factor that leads to reduced muscle mass, reduced muscle strength, impaired concentration, etc. – many of the symptoms associated with aging. This has led to a burgeoning industry that has exaggerated

---

<sup>121</sup>S Leigh-Smith, *Blood boosting*, 38 *British Journal of Sports Medicine* 100 (2004)

<sup>122</sup>This is usually the result of a tumor in the pituitary gland.

<sup>123</sup>The first symptoms of acromegaly include swelling of the soft tissues in the hands and feet. Then, changes in bone structure will manifest in the person's face – the brow and lower jaw will protrude, the nasal bone enlarges, and the spacing between teeth increases. The overgrowth of bone and cartilage can often lead to arthritis. Lastly, the growth of tissue can trap nerves and lead to carpal tunnel syndrome, which is characterized by numbness and weakness of the hands. (From the National Institute of Health website: <http://www.endocrine.niddk.nih.gov/pubs/acro/acro.htm>.)

<sup>124</sup>Unlike acromegaly, which occurs and affects fully-grown adults, gigantism is the manifestation of the disease in children. The excess of growth hormone leads to increased growth of the long bones (i.e., the limbs), which leads to increased height. Many of the 'giants' in history, including Robert Wadlow, the tallest man in history at 8'11", suffered from this disease.

and fabricated the benefits of human growth hormone by touting it as a veritable fountain of youth. The benefits that aging members of the population are trying to capture are the same ones that athletes are trying to utilize when they abuse human growth hormone – increased strength, coordination, and mental capabilities.

Unlike anabolic steroids and blood doping, where the beneficial aspects are generally proven and accepted, the benefits of human growth hormone as an ergogenic aid are not as unanimously accepted. There has been extensive anecdotal evidence of benefit by athletes – after all, human growth hormone would not be such a desired and controversial drug if athletes that used them did not experience any benefits (real or imagined) from its use. Barry Bonds, one of baseball’s biggest stars, and widely suspected of using performance-enhancing drugs, is reported as having used human growth hormone extensively.<sup>125</sup> In *Game of Shadows : Barry Bonds, BALCO, and the Steroids Scandal that Rocked Professional Sports*, the writers, Mark Fainaru-Wada and Lance Williams, claim that Bonds was particularly fond of human growth hormone for multiple reasons. First, growth hormone, like steroids, allowed him to increase his muscle mass, but unlike steroids, it also strengthened joints and connective tissue, thus decreasing the likelihood of blowing out a joint.<sup>126</sup> Additionally, growth hormone left him feeling energized and flexible, while still maintaining that muscle-bound appearance that he was so used to. Lastly, as someone who always had phenomenal eyesight that allowed him to track the seams on baseballs coming at him at 90+ miles per hour, Bonds felt that his vision quality was declining, as he reached his mid-thirties. Use of growth hormone reversed that trend, he felt. He could see the baseball better than ever.<sup>127</sup> It is unconfirmed whether this was the actual effect of growth

---

<sup>125</sup>Fainaru-Wada & Williams, *supra*.

<sup>126</sup>In *Game of Shadows*, the authors document a previous incident when Bonds used steroids and built up so much mass that he ended up blowing out his elbow by tearing his left tricep tendon. Bonds and his trainer speculated that this was the result of putting on so much muscle on his arms that the accompanying joints and tendons were not able to support all the muscle mass. Bonds felt that growth hormone was able to rectify that problem.

<sup>127</sup>*Id.*

hormone, or merely a psychosomatic experience resulting from the placebo effect. There are some scientific studies have demonstrated that use of human growth hormone has positive ergogenic benefits. For example, one study found that human growth hormone exerts a net anabolic effect on protein metabolism.<sup>128</sup>

However, there are also a significant number of studies that demonstrate that human growth hormone has little to no benefits for athletes. One 1993 study, conducted by the University of Vienna, found that the administration of human growth hormone to 22 serious athletes had no net effect on body weight, body fat, or the strength of the biceps or quadriceps.<sup>129</sup> Another study tracked 16 untrained men who underwent a 12 week muscle-building program, where half the men were given human growth hormone, and the other half was given a placebo. While the study found an increase of fat-free mass and total body water in the subjects who had been administered human growth hormone, there was no difference in muscle protein synthesis, muscle size, or strength.<sup>130</sup>

Generally, the side effects of human growth hormone treatment for those suffering from growth hormone deficiency are minimal. There are very few risks associated with the therapeutic treatments. However, for those with normal levels of growth hormone, the potential negative side effects are under much debate, just like the potential positive effects of human growth hormone for those people. Some claim that the risks of using human growth hormone in “pharmacologic doses,” even for non-therapeutic uses, are very rare.<sup>131</sup> However, other sources find that possible side-effects, which are similar to those for adults suffering from acromegaly, are carpal tunnel and increased insulin resistance.<sup>132</sup> In fact, in the study cited, two

---

<sup>128</sup>M. L. Healy et al., *High Dose Growth Hormone Exerts an Anabolic Effect at Rest and during Exercise in Endurance-Trained Athletes*, 88 *The Journal of Clinical Endocrinology & Metabolism* 5221 – 5226 (2003).

<sup>129</sup>R. Deyssig et al., *Effect of growth hormone treatment on hormonal parameters, body composition and strength in athletes*, 128 *Acta Endocrinology* 313-8 (1993).

<sup>130</sup>E. Randy Eichner, *Ergogenic Aids: What Athletes Are Using – and Why*, 25 *The Physician and Sports Medicine* 4 (1997).

<sup>131</sup>See [http://en.wikipedia.org/wiki/Growth\\_hormone#Risks\\_of\\_GH\\_treatment](http://en.wikipedia.org/wiki/Growth_hormone#Risks_of_GH_treatment).

<sup>132</sup>Eichner, *supra*.



of the men who were given human growth hormone contracted carpal tunnel syndrome.<sup>133, 134</sup> The only general consensus is that, like anabolic steroids, there have been very few studies to determine the long-term effects of the administration of human growth hormone to those whose bodies naturally produce enough growth hormone. Thus, many short-term, as well as most long-term, side effects have not been scientifically tabulated and studied.

## Policy

Now that the history, background, and medical effects of various performance enhancing drugs has been established, the question becomes whether or not they should be banned from sports. Most of the time, the consensus is a resounding yes, but without a substantiated rationale or justification. Many of the rationales provided often include phrases such as, “integrity of the game,” or “sportsmanship” or “unfair advantage,” but are those ideas valid bases for banning performance enhancing drugs? When athletes try to achieve athletic excellence through the use of chemicals and drugs, widespread condemnation never fails to ensue. Is that condemnation justified, or have we, as a nation and society, simply presumed the conclusion that excellence assisted by chemicals and drugs, should be discouraged and prohibited? Some of that condemnation might stem from the fact that the athlete is cheating and disregarding the rules of the sport. However, the sentiment against “cheating” must be set aside in this analysis because it merely presupposes the rule against doping, the rule which this paper is analyzing. If there is no rule against doping, then an athlete’s use of performance enhancing drugs would no longer be cheating.

---

<sup>133</sup> *Id.*

<sup>134</sup> One cannot help but speculate whether the cause of the carpal tunnel was actually the result of engaging in an intensive 12 week muscle-building program, which presumably included weight-lifting as well, rather than the use of human growth hormone. The study does not mention any discussion of that, so there is no definitive answer to this speculation.

Harm is practically the universal reason for banning steroids and other performance enhancing drugs from sports, whether it's harm to the sport's integrity, physical harm to the athletes, harm to the children, etc. Thus, a general idea of "harm" is much too broad and vague to lend itself to careful analysis. Rather, each type of harm must be carefully examined to see whether it serves as a valid basis for banning performance enhancing drugs.

#### *Harm to the User Athlete*

The primary reason that is relied on, or often just presupposed, is that steroids, and other performance enhancing drugs, are the likelihood of serious physical harm that can result from their use. There are numerous problems with a prohibition that is based on this argument.

The first problem with this rationale is that it makes the assumption that the use of these drugs will lead to, or have the high likelihood of leading to, serious physical injuries. The problem with such an assumption is that most of these performance enhancing drugs have not been sufficiently studied under controlled situations to know how truly dangerous they are. For more detailed analysis of this issue, see discussion under Health Effects of Doping: Anabolic Steroids. There is the possibility that controlled usage, under medical supervision, could result in minimal possibility of physical injury to the user. While this possibility is rather remote for anabolic steroids, other performance enhancing drugs and techniques, such as blood doping and human growth hormone, have a significant possibility of being used without physical harm,. Thus, it seems that for at least some banned drugs, potential harm to the user is not a sufficient justification for banning its use.

Even granting the assumption that some performance enhancing drugs, such as anabolic steroids, carry a serious risk of physical harm, that risk might not be sufficient in banning steroid use. The most fundamental argument against this rationale is the anti-paternalism sentiment that pervades sports, and more generally, American culture. If we are to accept the "harm principle," as described by writers such as J.S. Mill,

then paternalistic interference on an individual's liberty on such grounds is prohibited. According to the harm principle, interference with a competent, consenting adult's decisions and/or actions is allowed only to prevent harm to others. This anti-paternalism sentiment carries some weight, simply on an intuitive level – if an athlete, knowing all the health risks and consequences of taking performance enhancing drugs, still decides to pursue the use of those drugs, because he feels that the potential benefits outweigh the potential harms, then why should anyone outlaw it? After all, we have no problems with an athlete deciding to run an extra 10 miles a week, on the belief that the benefits of extra training will provide will exceed the potential drawbacks and injuries that extra training might cause. Prohibitions on this form of training or any other type of training would be unthinkable and unpalatable to the general public, even if it were possible to overcome the logistical obstacles in enforcing such a ban. By analogy, prohibitions on use of doping, based simply on harm to the user, should also not be permitted.

However, this line of argument assumes the acceptance of the harm principle. Acceptance of the harm principle should not go without analysis. There are many aspects of life where the government violates the harm principle and tells people what they should do. Even in sports, leagues have created rules that smack of paternalism – primarily the requirement of its players to wear safety gear. For example, helmets were not required in the NHL until 1979, when the NHL required all future draftees to wear helmets. Even though the NHL let veterans make the decision of whether or not to wear helmets, it was paternalistic and forced newcomers to the league to wear helmets. The same debate is currently raging about the requirement of using clear, protective visors, or half-shields. Many players have been seriously injured when a puck struck their faces around the orbital bone, sometimes causing permanent blindness in one eye. As a result of these injuries, there has been increased pressure for the NHL to require the use of visors. While no such rule has been adopted yet, some analysts say that such a rule could be adopted within as soon as two years.<sup>135</sup>

---

<sup>135</sup>Ted Montgomery, *Ted Mouths Off: Post-lockout NHL resurrection for ex-stars Jagr, Lindros*, USA Today, November 1, 2005.

These are blatant examples of paternalism, where the league removes the decision from the player's hands and forces the player to follow a certain course of action. In the case of helmets or visors, the league must have decided that the benefits to wearing a helmet were so overwhelmingly greater than the drawbacks that the league simply made the decision for them. One might argue that steroids fall into the same category as well – the dangers and drawbacks from use of the drug overwhelm any benefits that the use might provide – which justifies its prohibition. While this characterization of the use of performance enhancing drugs might not be completely accurate, it does demonstrate that paternalistic actions abound in sports, so the harm principle should not be accepted automatically at face value without serious scrutiny and critique.

A corollary to the anti-paternalism school of thought is that even if performance enhancing drugs were to cause harm, it is no different from the harms that already exist in athletics. One can reasonably argue that the threat of physical injury every time a professional football player steps onto the field is much greater than the possibility of injury from taking anabolic steroids. If we allow the dangers that occur in the course of competition, why do we not allow these other dangers as well? However, this argument is not persuasive, because there is a difference between the harms inherent to a sport and the harms external to a sport. In most sports, it would be practically impossible to remove the risk of bodily injury without drastically changing the game to an unrecognizable form. Just imagine sports such as boxing or football, with the risk of injury removed; it would be a whole different sport. On the other hand, the potential injuries that stem from doping are easily removable from the sport without changing the basic principles of the sport, or altering the sport too dramatically.

Even if one were to accept the harm principle, there are possible arguments that try to reconcile the existence of a doping policy with the harm principle. One argument is that because the harm principle only prohibits

interference if the adult's decisions are fully consensual, the prohibitions are permitted in this case because the athlete does not give full, informed consent when he or she decides to take the drugs. This occurs either because the athlete does not fully understand what he is taking, or he is somehow coerced into taking the drugs. While lack of understanding might have been very likely during the 1970s and the height of the East German swim team doping program, present day athletes are much more aware of the chemicals they ingest and the health ramifications of any supplements. It is extremely unlikely that a present day athlete would knowingly use a performance enhancing drug without having, at least, some idea of what the health consequences are. It is more possible that an associate of athlete tampers with the athlete's supplement and thus coerces the athlete into unknowingly taking a performance enhancing drug, but stories like that have been rare.

The second argument, one of coercion, is much more interesting. The coercive force can generally be classified into one of two categories. One type of pressure takes the form of specific, directed coercion from teammates, managers, coaches or even the athlete himself. These people are somehow invested in the performance of the athlete, so they end up pressuring him, either overtly or subtly, or he pressures himself, to take the performance enhancing drugs. The other type of coercive force might be characterized as a more diffuse pressure that exists because other athletes are doping. The athlete engages in doping only because he sees that a significant portion of his competition has been doping, so he does it just to keep up. If it weren't for the pressure to excel, he would not engage in doping. However, therein lies the difficulty with such a characterization of coercion.

Coercion is almost never as simple as black or white, so at what point does external pressure rise to the level of coercion? If one is forced to choose between a certain act and death, then that is definitely coercion, but no one is suggesting that professional athletes can only choose between death and doping. Lower levels

of pressure are all a shade of gray. For example, as more and more members of Hollywood undergo plastic surgery, the pressure increases on other actors and actresses to artificially enhance their appearance as well, but no one would ever say that they are being coerced into having plastic surgery. After all, they, like athletes, have other options, such as taking lesser-paid jobs or exiting the industry completely. The other options might not be attractive, but are they so horrific that the decision to have plastic surgery, or use performance enhancing drugs, is coerced? Practically all decisions in life are made with the consequences of the alternatives in mind. If all occupations paid the same, the writer of this paper would probably pursue an alternative career, but they do not, so he has chosen a post-law school job at a law firm. That hardly means that he has been coerced into working at a big law firm. The point is that while the pressures placed on athletes to perform might be extremely substantial, but the athlete always has the option of performing at a relatively lower level or leaving the game completely. The athlete can make his own decision as to whether or not the potential harms of performance enhancing drugs are worth the additional money, prestige, and fame; it is not coercion. Additionally, there is no inherent reason why the pressure to engage in doping is any more morally suspect than the pressure to train harder or longer. Of course, there could be a difference between the competitive pressures exerted from drugs versus the competitive pressures from training, but the differences should not simply be presupposed without a second thought, as they often are.

One interesting side note is that if it is decided that athletes are coerced to take these drugs, then issue of whether or not the drugs pose a serious physical harm is moot. The fact that an athlete ends up taking drugs without his/her informed consent is harmful to the athlete, in and of itself. Even if the drugs were entirely beneficial with no drawbacks, athletes should never be compelled to take the drugs. Such a rationale for prohibiting doping would be a sufficient justification, regardless of physical harm, as long as athletes would be otherwise coerced into using performance enhancing drugs.

However, one way to justify a doping policy that might hold up under scrutiny is to analogize sports and the ability to dope with a multi-player prisoner's dilemma. In the prisoner's dilemma, each player has an incentive to betray the other players. The incentives are structured in such a way that regardless of what other players do, each individual player will be better off in the short term if he betrays, rather than cooperates with, the other players. However, as a whole, the entire group is best off when everyone cooperates. It is possible to characterize a sports league like a prisoner's dilemma if we assume two conditions: 1) doping improves every athlete's performance by the same amount,<sup>136</sup> and 2) the detrimental effects of doping are sufficiently minimal that the positives far outweigh the negatives.<sup>137</sup> Regardless of whether other players decide to dope, each individual player is better off in the immediate future if he decides to dope (i.e., betray), since it will improve his athletic abilities. This mentality (or in this case, dominant strategy) results in every athlete doping. However, if every athlete in the league dopes, and it benefits each athlete the same amount (as was the assumption), then every athlete is performing at the exact same level relative to other athletes, that he was performing at prior to the use of performance enhancing drugs. Thus, everything would be the same as if everyone did not dope, except now all the athletes must deal with the detrimental effects of doping.<sup>138</sup> If everyone had simply chosen not to dope (i.e., cooperate) originally, then everyone would be better off. It is not unlike a "race to the bottom" phenomenon. By imposing a prohibition on doping, the league is essentially forcing "cooperation" from the athletes and removing their ability to "betray" the other athletes. It is preventing the athletes from being able to "race to the bottom." Such a justification is not paternalistic because the ban is not based on the league's evaluation that its athletes cannot make an accurate

---

<sup>136</sup>This is obviously an inaccurate characterization of the effect of many performance enhancing drugs, but it allows for the simplification of the model without changing the results.

<sup>137</sup>Again, the veracity of such an assumption is very much up for debate, but it simplifies the model, while allowing the model to maintain its fundamental character. Not granting these two assumptions would merely complicate the model greatly, without changing the end result.

<sup>138</sup>The model assumed that the detrimental effects were sufficiently minimal, but not necessarily nonexistent.

determination of pros and cons in deciding whether or not to take performance enhancing drugs. Rather, the ban is based on preventing “non-cooperation” or a “race to the bottom”, and enforcing “cooperation” among the athletes. The league is merely doing what each player would have decided if he were able to impose consensus on the entire league. This rationale holds up to scrutiny, so an anti-doping policy based on such a rationale would be justified.

#### *Harm to Non-user Athletes*

The other proviso in the harm principle is that the decision or action cannot harm others. A strong argument can be made that an athlete’s decision to dope does result in harm to other athletes. However, the harm is unlikely to be a physical one,<sup>139</sup> but more of a mental and reputational harm. One such harm is the coercive pressures that dopers put on non-dopers to start using performance enhancing drugs. The previous section has already discussed this pressure and the author’s skepticism that it stands up to stringent analysis. The other type of harm occurs when a clean athlete does not perform as well because other athletes have decided to use performance enhancing drugs. This can happen either because the clean athlete is competing directly opposite the doped athlete, such as a batter versus a pitcher in baseball, or because the clean athlete performs worse relative to the doped athlete, such as marathon running. Either way, the clean athlete suffers since his performance is not as impressive as the doped athlete’s. The harm can be purely reputational (the clean athlete is no longer the world’s best marathoner), or tangible, such as monetary loss (loss of prize money or sponsorships).

---

<sup>139</sup>While it is difficult to come up with a scenario where one athlete’s doping leads to a physical harm of another person, it is not impossible. One possibility is that in contact sports, such as football, a doped up athlete becomes so fast and so strong that he is more likely to injure an opponent. The other possibility is that use of steroids will trigger an uncontrollable anger, also known as “roid rage,” and cause an athlete to use violence towards another athlete. This second possibility seems quite far-fetched, but it might have actually happened. During the training camp prior to the start of the 2003 NFL season, an unprovoked Bill Romanowski, who has since been confirmed as a steroids user, punched a teammate’s face and broke his orbital bone, which eventually ended the teammate’s playing career. Of course, there is no concrete evidence that this action stemmed from “roid rage,” but the circumstances seem to indicate it is a possibility. However, even if it were the result of “roid rage,” such scenarios seem so rare and unforeseeable that it would not be a sufficient justification for banning steroids.



However, this begs the question: how is this harm different from the harm that occurs when an athlete is eclipsed by other athletes who have improved their performance through harder training? There is a presupposition that harm through performance enhancing drugs is more morally suspect than harm through harder training, perhaps due to a sense of desert – the person who trained harder somehow earned that advantage, so he deserves it. The only problem with that argument is that there are plenty of advantages in sports which are not earned. All athletes are *not* created equal, yet those inherent advantages are permitted. Thus, it is difficult to find a sufficient rationale for banning performance enhancing drugs based on harm to non-doping athletes, that isn't inconsistent with currently accepted views and opinions.

#### *Harm to Children*

One harm that is often cited is the negative influence that doping has on children. The argument has many facets. One argument is that teenagers are highly impressionable, so when they see their role model athletes doping, they will be encouraged to dope as well. First, in order for this phenomenon to be undesirable, we must assume that doping has negative health consequences on the young. Second, even if it does, why should this necessarily limit the freedom of competent adults to do what they want? We don't prevent athletes from heavy weightlifting regimes, even though similar acts by teenagers might lead to injury, since their bodies are too physically immature to bear the stress. In fact, society has even celebrated or glamorized such acts in television shows and commercials.

We don't prohibit athletes from drinking alcohol either, when the exact same argument can be made – an athlete's consumption of alcohol will encourage his impressionable teenage fans to imbibe. This is especially compelling given all the injuries and deaths that accompany underage drinking. According to the National Institutes of Health, every year, underage drinking is a factor in 2400 automobile accident deaths, 1600

accidental deaths (unrelated to motor vehicle crashes), 1600 homicides, and 300 suicides.<sup>140</sup> However, no one would consider a prohibition on an athlete's liberty to drink alcohol. Of course the connections between doping in professional sports and teenage steroid use is a lot stronger than an athlete's drinking and underage drinking, due to various social pressures and contexts, but this argument is merely to point out that adults are granted many more freedoms than minors, so the mere fact that an athlete's actions might encourage a teenager to do something detrimental is not reason enough to prohibit the athlete from engaging in that act. After all, why should such a significant burden of underage doping prevention be placed on professional athletes who are far removed from the everyday life of teenagers, rather than the parents, coaches, and teachers who interact with teenagers every day and have a more direct impact?

Another aspect of this argument is that when professional athletes flaunt the rules by using performance enhancing drugs, it sends the message to teenagers that it is acceptable to cheat the rules of the game. This sentiment is misplaced, along with the general "cheating" sentiment exclaimed earlier. If it is decided that doping is no longer against the rules, then an athlete's use of performance enhancing drugs would no longer encourage teenagers to cheat, so such a sentiment is not a sufficient basis for banning drugs, as it merely presupposes that the prohibition of doping should exist.

### *Harm to Integrity of the Game*

Many people argue that the use of performance enhancing drugs damages the integrity of the game. It is difficult to accurately analyze this harm, since the phrase, "integrity of the game" is so general and vague. One possible way to describe it might be that the principles and beauty of the game are ruined because challenges and obstacles that existed before are no longer as significant. However, one must remember that

---

<sup>140</sup><http://www.niaaa.nih.gov/niaaa.nih.gov/Templates/CommonPage.aspx?NRMODE=Published&NRORIGINALURL=%2fAboutNIAAA%2fNB994-4BCB-9F24-F8DFDCD8A411%7d&NRCACHEHINT=Guest#statistics>

most, if not all, sports have evolved from their original form. In baseball, the height of the pitcher's mound has been altered numerous times in the past few decades and the dimensions of baseball parks have changed dramatically as well. In football, rules are modified every year and the technology of equipment has advanced dramatically in the past couple of decades. The point is that sports have always constantly evolved as ability, performance, and technology have advanced. Additionally, chemical assistance in sports goes as far back as competition itself (See History of Doping and Anti-doping Efforts: Doping in Ancient Times), and sports still captured the nation's attention and progressed to the point where it is today. It is inconsistent to allow changes in the sport, while holding onto a romanticized ideal of a sport's immutability as a rationale for banning performance enhancing drugs.

#### *Level Playing Field*

Another argument often used against doping is that it changes the otherwise level playing field on which all athletes compete. This argument can be quickly rejected as the playing field of athletic competition was never level to start out with, and never will be level. First, there are tremendous innate differences between all of our bodies. Each athlete has been born with certain abilities and limitations that are distinct from others. Besides the obvious differences of height and strength, there are many other differences which are not as visible, but contribute significantly to athletic success. Some athletes' bodies naturally produce more testosterone than others, or have more red blood cells, so they have a significant advantage. For example, Lance Armstrong was tested on the amount of oxygen his lungs were able to consume during exercise, also known as Maximum Volume of Oxygen, or VO<sub>2</sub> Max, a critical factor in endurance sports. His results were the highest that the clinic had ever recorded,<sup>141</sup> which indicates a tremendous advantage over his rivals and might, at least partially, account for his record setting seven Tour de France victories. The field of athletic competition has never been equal, so a notion of equality should not be the basis for banning performance

---

<sup>141</sup>Michael Specter, *The Long Ride; How did Lance Armstrong manage the greatest comeback in sports history?*, New Yorker 48, July 15, 2002.

enhancing drugs.

*Artificial Character of Performance Enhancing Drugs*

Perhaps then the argument is that so-called natural advantages are acceptable, while artificial ones are not. But this argument is flawed as well. In modern day sports, there are plenty of “unnatural” advantages which do not suffer from the condemnation of the public. One example is ulnar collateral ligament reconstruction, more commonly known as Tommy John surgery. It used to be that once a baseball pitcher tore the elbow ligament in his pitching arm, his career was over. However, modern day medicine allows doctors to perform a procedure where a tendon is removed from either the wrist or hamstring and is then weaved into the elbow, which allows the pitcher to resume pitching after rehabilitation. The rebuttal is that this operation merely restores the athlete to his previous baseline, but doesn’t provide any advantages. However, this is false; many times, the surgery allows the pitcher to throw even harder than he did before he tore the ligament.<sup>142</sup> Kerry Wood, an All-Star pitcher on the Chicago Cubs, has said, “I hit my top speed (in pitch velocity) after the surgery. I’m throwing harder, consistently.”<sup>143</sup> Billy Koch, the hard-throwing reliever, hit speeds of up to 108 MPH after the surgery, according to some reports.<sup>144</sup> “I recommend it to everybody... regardless what your ligament looks like,” he said, only half-jokingly.<sup>145</sup>

Another medical procedure that has aided athletic performance is laser eye surgery, which permanently corrects vision problems such as myopia (near-sightedness), far-sightedness, and astigmatism. It is undeniable that laser eye surgery has acted as an ergogenic aid and improved athletic performance. Many athletes, such as Troy Aikman, Tiger Woods, and Greg Maddux have undergone this procedure with tremendous results.

---

<sup>142</sup>Mike Dodd, *Tommy John surgery – Pitcher’s best friend*, USA Today, July 29, 2003, at 1C.

<sup>143</sup>*Id.*

<sup>144</sup>*Id.*

<sup>145</sup>*Id.*

Greg Maddux has said that the surgery allowed him to focus on the plate better than ever, and hitters have said that it allows them to pick up the baseball more quickly and effectively.<sup>146</sup> Tiger Woods said that after the surgery, the hole looked bigger and he was able to read the greens better.<sup>147</sup> Like Tommy John surgery, a proper response cannot be that it merely restores vision to a natural baseline level either, because many of these athletes, including Tiger Woods and Greg Maddux improved their vision to 20/15, even better than “perfect vision” of 20/20. There are plenty of non-natural enhancements that are permitted in sports, but none of them are prohibited or scrutinized nearly as much as performance enhancing drugs. Thus, banning drugs on the basis that they are “non-natural” is an inconsistent and flawed argument.

### *Democratic Nature of Sports*

The rules and regulations in sports are a social construct, usually determined by the executives in charge of sports leagues. There are no inherent rules which require that home plate must be 90 feet away from first base, or that a forward pass must start from behind the line of scrimmage, or that a basketball shot from 23 feet, 9 inches away is worth three points, while shorter shots are worth two. These are simply rules that have been instituted in the sport as it has evolved; there is not necessarily any underlying rationale for these rules. When certain rules change, there isn't always a concrete justification or logic behind it; rather, rules are implemented or eliminated or modified because enough people want them changed that the powers in charge change them. The same might be said of doping regulations. Current society has the opinion that doping should not be allowed, even though it can not quite come up with a completely consistent and logical reason why it should be banned. Some have compared it to the rules of language: a native speaker knows when something sounds right or wrong, but often cannot exactly identify why.<sup>148</sup> This justification may

---

<sup>146</sup>*Athletes Fuel Eye Surgery Trend*, Milwaukee Journal Sentinel, April 5, 2000.

<sup>147</sup>Craig Bestrom, *Eyes of Tiger*, Golf Digest, June 2002.

<sup>148</sup>Michael Lavin, “Sports and Drugs: Are the Current Bans Justified?” in *Sports Ethics: an Anthology* 189 (Jan Boxill ed. 2003).

sound extremely unsatisfying, since it essentially says that doping should be banned because people want it banned, but in the end, that may be what it comes down to. Sports competition is a significantly democratic enterprise, as sports will flourish only with the continued support and following of society, so the opinions of society are what ultimately shape the rules of sports, regardless of whether those opinions are necessarily grounded in hard, consistent logic.

### *Harms from Anti-Doping Rules*

When evaluating the efficacy or propriety of anti-doping policies, we must also keep in mind that the enforcement of these rules does not come without a cost. These bans require a tremendous expenditure of resources, from the constant research on banning new drugs to the collection of all the urine samples to the actual testing of all those samples. It is a very costly and time-consuming process. Additionally, all anti-doping bans operate under strict liability. It is practically impossible to prove an athlete has intentionally and purposefully taken a drug, so strict liability is the only regime which could possibly work. This undeniably ends up ensnaring athletes who unintentionally ingested some banned substance. In the case of athletes who took a performance enhancing drug, this creates a moral dilemma since the athlete never meant to cheat, but likely benefited from the use of drug during competition. Regardless of the tension, the athlete is almost always found guilty due to the strict liability regime.

On the other hand, consider the story of Zach Lund, a top skeleton racer for the US Olympic team. He barely missed the Olympic team in 2002 and vowed to train harder than ever to qualify for the 2006 Olympics. However, the month before the 2006 Olympics, it was found that he tested positive for finasteride, the active ingredient in Propecia, a hair replacement product.<sup>149</sup> He had been using the product publicly for more than seven years, but it had just been placed on the Prohibited List in 2005 due to its ability to mask the

---

<sup>149</sup>Mike Dodd, *Zach Lund gets one-year ban, will miss Torino Games*, USA Today, February 10, 2006.

use of steroids.<sup>150</sup> He claimed to have last checked the banned list in 2004. The Court of Arbitration for Sport (CAS) said that it was entirely satisfied that Mr. Lund was not a cheat,<sup>151</sup> especially since skeleton racers would likely be harmed by the use of steroids.<sup>152</sup> It was especially concerned that no one notified him of finasteride's new status when he declared it during drug testing in 2005.<sup>153</sup> Regardless, CAS still handed down a one year suspension, which prohibited him from competing in the 2006 Olympics.

Mr. Lund is not without fault; it was his responsibility to check the prohibited list. But all parties involved were satisfied that he did not intend to cheat. He publicly declared use of the drug, but no one involved in the testing process bothered to inform him of the change in policy. Additionally, the banned substance itself was not an ergogenic aid. Rather, the reason it was on the list was because it would merely mask another drug, the use of which would have likely impaired his performance. Luckily, there have not been many stories like this, but as WADA expands the scope of banned drugs, these incidents are likely to occur more and more often. If it starts occurring at significant rates, then one must consider the possibility that the harms and costs of an anti-doping policy might be too great, no matter what the benefits might be. Regardless, anti-doping policies do come with a cost, which are often ignored in the debate about performance enhancing drugs.

## Conclusion

Throughout the long history of sport, participants have always sought an advantage over their opponents, be it through training, technique, equipment, or medicine. Steroids, human growth hormone, and other performance enhancing drugs are merely the most recent development. And while there is strong anecdotal evidence about the detrimental effects of many performance enhancing drugs, there is still much to be

---

<sup>150</sup>*Id.*

<sup>151</sup>*Id.*

<sup>152</sup>Skeleton racers require sleekness in order to effectively race down the track head first. Extra muscle and bulk would be detrimental to the quest for speed.

<sup>153</sup>Dodd, *supra*.

learned and studied about many other drugs. The medical consensus for many of these other drugs has yet to be reached, and perhaps, society and public opinion should allow the drugs to be fully investigated and researched before reaching a conclusion about the dangers and immorality associated with the use of such drugs.

That being said, there have been many rationales set forth by commentators, analysts, and the public at large, as to why performance enhancing drugs should be banned from sports. Many of these arguments, as this paper has sought to demonstrate, are spurious and should not be grounds for banning steroids from the game. However, there are a couple arguments that stand up to rigorous analysis. One is the physical harm that many of these drugs are strongly suspected of causing. This rationale is particularly strong when viewed from the context of the prisoner's dilemma. The other argument is not so much a rationale, as merely an explanation: performance enhancing drugs should be banned because society says they should be banned. The democratic nature of sports requires that sports ban performance enhancing drugs. But it should be noted that these bans are not without costs and harms to innocent athletes, and these costs should be kept in mind when evaluating whether to maintain, expand, or eliminate doping policies. When all's said and done, however, sports leagues are doing the right thing by prohibiting the use of steroids and other performance enhancing drugs by their athletes, at least until additional medical consensus is reached.