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# Athletes and Steroids

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Athletes and Steroid Use

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# Athletes and Steroid Use

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### **Introduction**

College athletes get drug tested for several reasons. The most basic reason is that sports organizations want to emphasize the honesty of the sports that they represent. They want to keep the integrity of the program at the forefront, because there is true admiration in true and fair competition.

Athletes most get tested through urine samples. Unfortunately, some people have gotten very clever over the years and have actually purchased a “clean” person’s urine to use in place of their own. For the most part, however, the process is legitimate, and it will reveal a few things about the athlete.

If an athlete is drinking excessively around the time of the test, it will be evident in the results. If an athlete has been using anabolic steroids or other illegal performance-enhancing drugs, it will show up on the report. Lastly, and almost most importantly, if an athlete has been using illegal drugs like marijuana (in most states), any form of narcotics, etc.

The use of drugs and alcohol by college students is often debated and almost always controversial. When it comes to student athletes, the topic gains special attention. It becomes evident that it is important to test the usage of drugs and alcohol among student athletes in a 2012 NCAA report. The report’s main purpose was to keep NCAA policy makers up to date on the levels of alcohol and drug use from both prior and current information (Druckman, 2015).

In a study conducted by researchers at the Universities of Northwestern, Arizona, and Aarhus, the team sought out to better draw the line between what types of drugs are being used by collegiate level athletes. Some athletes use performance enhancing drugs. These are, for the most part, all

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against NCAA regulations. Some, however, include nutritional supplements that are perfectly legal and within regulations to consume.

Per the study, “the commonly used self-report method for estimating drug and alcohol use found in existing studies, including in the aforementioned NCAA report, seem to understate usage,” (Druckman, 2015).

This information is not surprising. Athletes know the trouble that they face when they decide to take drugs in any capacity while they are in college. It makes sense that they would not make honest reports, even anonymous ones, about how much or how often they are using.

Some differences that were to be expected exist between genders. Though males and females both have a significant presence in the world of collegiate level athletics, the numbers of female athletes that report using performance-enhancing drugs differ drastically from the numbers of male who report using them.

*[Buckman et al. (2008) find that among male student-athletes, 9.7 percent say they use “banned performance enhancers” and 55.8 percent say they used “performance-enhancing drugs” (which might include legal nutritional supplements). Among female student-athletes, no one said they use “banned performance enhancers” and 29.8 percent said they used “performance enhancing drugs.”] (Druckman, 2015)*

As much as we would like to be able to apply these findings to real-world situations, the sample loses its reliability because the students who gave this information were essentially required to because they were in a mandatory alcohol education program (Green et. Al., 2001). Because of this hiccup in the findings, Green and his team took part in an additional study. In this study,

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they surveyed student athletes in Divisions 1, 2, and 3. They found that 80.5 of those students who participated reported to having used alcohol.

“Perhaps the most impressive and exhaustive survey of athlete drug use was done by the NCAA (2012) itself in 2009. It drew a stratified sample of institutions from all 1,076 active member institutions of the NCAA and surveyed three prespecified teams per school with an ultimate sample of 20,474 respondents,” (Druckman, 2015)

It is important for these types of studies to be done in just this manner. The sample population must be random, but the group also needs to be relevant enough to be able to generalize the results from. For instance, it may not benefit the advancement of the research for this topic if the NCAA had decided to survey the chess team. Since that group makes up such a small percentage of the athletic groups that are a part of the NCAA, it would have been pointless to include those numbers in the findings.

The survey required many steps to make sure that the results were anonymous. Firstly, they had to provide a preaddressed and stamped envelope to be returned to a third-party vendor. The survey also did not ask for any information that could potentially identify the student.

The survey consisted of questions about behaviors typically associated with alcohol and drug use. Some of the findings were that less than half of one percent of respondents reported using anabolic steroids within the last year. Also, over fifty percent of the respondents reported to having used alcohol in the last year. I think it is important to note that alcohol has a different stance in society and American culture than other drugs and things of that nature.

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For instance, alcohol, tobacco, and caffeine are the only recreational use drugs that get advertised on network television and commercials. They are very normalized. One would be hard-pressed to find a television show whose cast was primarily adults that didn't mention or overtly show said adults drinking alcohol. Common phrases such as, "I need a drink" are used to desensitize the public to alcohol, albeit one of the most dangerous drugs in terms of lives it has claimed.

This attitude does not change for the students just because they start school. The alcohol culture is exacerbated in college, as a matter of fact. Every party, every private social gathering, and every athletic event has alcohol present. It can be hard for sometimes 18 and 19-year-old kids to not be enticed to drink when they consider the stands at their games and see everyone else enjoying a cold beer.

Even still, the numbers in any self-report based around sensitive information is subject for invalidity. Some people find it so stressful to admit something that they have done that they shouldn't have that, even in a case of total anonymity, they will still fabricate the results for fear that there is any way they could be potentially identified.

*[Indeed, the report acknowledged that "Even with these measures to ensure anonymity, self-report data of this kind can be problematic due to the sensitive nature of the issues. Therefore, absolute levels of use might be underestimated in a study such as this" (2012:5). "In sum, while research to date provides valuable information, it is plagued by the nontrivial threat of arriving at substantial understatement of usage. Reliance on self-reports leads to underreporting due to social desirability and threat of disclosure influences (Tourangeau and Smith, 1996; Tourangeau et al., 2000)."* (pg. 2)

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Some of the students may have underreported their use of drugs and alcohol because of the shame of it all. Some behaviors, especially illicit drug use, go against cultural norms. At a time in their lives when young people want nothing more than to fit in, it might be very uncomfortable for them to place themselves in an ostracized group, even if only in a random survey. They know that someone, somewhere is going to read their answers, even though a face won't be placed with the information.

Another reason is like the aforementioned reason of not being totally sure that the results won't somehow get tied back to them. How reliable is this third-party vendor?

[Questions about drug or alcohol usage in general have long been noted as carrying with them social desirability and threat of disclosure problems. For example, Tourangeau and Yan state: "To cite just one line of research . . . studies that compared self-reports about illicit drug use with results from urinalyses . . . found that some 30%–70% of those who test positive for cocaine or opiates deny having used drugs recently. The urinalyses have very low false positive rates . . . so those deniers who test positive are virtually all misreporting"] (Druckman, 2015)

These findings from Tourangeau and Yan show that foregoing to report the truth when it comes to drug and alcohol use is not exclusive to college athletes. This could be evidence to a deeper issue of self-loathing in individuals who abuse these substances, because they are aware that it is wrong. However, to stay in the confines of the paper, the reasons why the athletes underreport is because the consequences that they face for having used drugs or excessive alcohol can result in them not being eligible to play their sport. Some college athletes are only able to attend their institutions because of athletic scholarships, which will be taken from them in the case of a severe enough NCAA infraction.

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As it pertains to the use of drugs and alcohol among student-athletes, there is definitely an issue with honest disclosure. This is because, if a student were to be found out to be abusing alcohol and drugs, he or she will not be eligible to play whatever sport they practice. In many schools, college athletics is a huge and profitable market. It is easy to see how this can become a big problem (Druckman, 2015)

The NCAA's position on alcohol is as follows: *“The following is a list of substances that are commonly abused, and how they can impact a student-athlete's performance and eligibility. Alcohol: Alcohol is a nervous system depressant. At high dosages, effects include mood swings, impaired judgment and inability to control motor functions. Alcohol can impair an athlete's performance through dehydration, depleting vital nutrients and interfering with restful sleep and recovery,”* (Druckman, 2015)

Using words like “impair” and “performance” and “dehydration” help to make the appeal hit home more for athletes. The time and dedication that these young people have put into their craft will often outweigh their desire to party. They understand that it would be incredibly ill-advised to use any substance that could make them perform worse or give them a disadvantage. The world of sports is very cut-throat, and it offers very little second chances, so the diction used by the NCAA to describe their policies on drug and alcohol use serves as a useful tool to deter abuse.

### **Why Do Athletes Use Performance-enhancing Drugs?**

When people mention anabolic steroids, most other people think of illegal drugs that are taken strictly for performance enhancement. Twenty-first century headlines are full of scandals

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surrounding athletes who didn't pass their drug tests. This notion also comes from the reports of the growing numbers of users.

Because synthetic anabolic steroids have become synonymous with drugs that people abuse, many people don't realize that researchers originally developed these supplements for treatment of medical issues. These drugs soon pervaded the world of sports faster than anyone could have anticipated.

The human body will produce steroids naturally. This is evident in one of the primary anabolic steroids—testosterone. Testosterone has masculinizing effects, hence why it is most present in biological males. It is essential for proper development of the male reproductive organs and also for body and facial hair to grow correctly. These steroids also increase strength and muscle size (DeWit, 2000).

Through the centuries, castration was used not only to domesticate animals but also on humans as punishment, to create eunuchs to guard harems or serve as priests, and to prevent the voices of choirboys from deepening.

Scientists were not in agreement as to how the testes controlled these changes. Some suggested that the testes and other organs regulated bodily functions by secreting substances into the blood, but most believed that the testes worked through the nervous system. With a simple experiment in 1849, German professor of medicine Arnold A. Berthold endeavored to find the answer to this age-old puzzle.

Berthold conducted an experiment in which he castrated four roosters. He then made a testis transplant into two of them. The roosters that didn't get the implants ended up being less

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aggressive. Also, their wattles and combs shrank. The chickens that received the implant kept their typical appearance and behavior. Berthold decided that the testes determine bodily characteristics even when they no longer have nerve connections.

In 1889, seventy-two year old French physiologist Charles- Edouard Brown-Sequard made the announcement that he had successfully injected himself with the extract of guinea pig and dog testicles in an experiment. He testifies that the experiment improved his health and rejuvenated him. Many scientists assert that Brown-Sequard's findings were a result of the placebo effect. This happens when a test subject's abilities and actions are compromised by suggestions that the researcher or others may have made before the experiment was conducted.

In 1905, British physiologist Ernest Starling coined the term *hormones* to the "*function-controlling chemicals secreted by the body*". For the next thirty years, scientists labored to properly identify the male hormone that is secreted by the testes. They believed that it had the potential to be very useful in the medical field.

Because it was so costly and difficult to extract natural testosterone, researchers tried to make up synthetic versions. Ruzicka and Butenandt discovered a way to produce synthetic testosterone in August of 1935. They coined the name "androgens" which means "producing male characteristics".

While scientists were hard at work trying to isolate and synthesize androgens, Charles D. Kochakian of the University of Rochester performed experiments that showed indicated that these compounds have properties that make them able to build tissues (DeWit, 2000).

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When World War II ended, doctors there gave treatment to After World War II doctors treated sickly survivors of the Nazi concentration camps with testosterone because of its effectiveness in building muscle. One problem that they faced was dealing with the female patients; they would begin to develop androgenic effects from use of the steroids. Some examples include females developing facial and body hair, enlarged clitorises, and much deeper voices.

Scientists worked tirelessly to come up with alternative versions of testosterone that could achieve muscle mass without the accompanying masculinization. They successfully reduced the androgenic effects, but they could never fully get rid of them. This is what gave “anabolic-androgenic” steroids their name.

Not all steroid groups have anabolic properties. For instance, glucocorticoids break down tissue—they are catabolic. Cortisone, which is a glucocorticoid, had its first synthetic version developed in 1935. It was used in 1948 as treatment for rheumatoid arthritis. These synthetic versions are referred to as corticosteroids, and they are very commonly used in medicine. Some other diseases that corticosteroids are prescribed for include: inflammation, asthma, allergies, and lupus.

Another group of steroids without anabolic properties includes the female hormones estrogen and progesterone. These steroids are primarily produced by the ovaries, but the testes of males and the adrenals of both sexes also produce small amounts. Female hormones also have synthetic counterparts that doctors prescribe for birth control, relief of premenstrual syndrome, and as replacement therapy when the body’s natural production of these hormones decreases.

While many doctors were looking for other medical applications for corticosteroids, there were those others that had a more lucrative approach to the situation. These doctors began to drum up

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ways that the drugs could be used to enhance athletic performance. Oddly enough, the first time these drugs were used in this capacity was not conducted on a human being—it was a horse.

The initial reports of human beings being given steroids to enhance their performance came from the early 1950s. On the west coast, bodybuilders began to experiment with testosterone. In 1952, at the Olympic Games, the Russian weight lifting team brought home seven gold medals. The U.S. team coach, Bob Hoffman, became suspicious and he accused the Russians of using testosterone. Two years later, John Ziegler, the team doctor, confirmed the allegation.

When Ziegler returned to the United States, he put testosterone to the test by taking it himself and giving it to Hoffman and a few east coast weight lifters. Although they experienced the drug's anabolic effects, which included prostate enlargement. The problem seemed solved in 1958, when Ciba Pharmaceutical Company released Dianabol, one of the modified steroids that were developed in an effort to reduce androgenic effects so the drugs could be used for medical purposes.

Ziegler began a training program with three weight lifters from the York Barbell Club, owned by Hoffman. These weight lifters took Dianabol and trained with isometric contraction, in which they worked their muscles against immovable objects. As the three made great gains in muscle size and strength, they drew the attention of other lifters, who wanted to know the secret of their success. Hoffman responded by publishing an article in a fitness magazine describing their training with isometric contraction. Other lifters followed the training program but did not get the same results. As the three continued to excel and became national champions, others learned the rest of their secret—Dianabol.

### **Olympic Athletes Embrace Steroids**

The rivalry that ensued between Russia and the United States during the Cold War had a large impact on how anabolic steroid use would be encouraged. The team doctors on the American Olympic teams believed that the Soviets would use their success in the sports realm (with the aid of anabolic steroids) to bamboozle the public and the world into thinking that the communist system was superior. By the time the 1960 Olympics rolled around, weight lifters from the United States had also begun using steroids.

By the late 1960s weight lifters and throwers were taking much higher doses of anabolic steroids, a practice known as stacking, in the belief that this would produce greater muscle gains than using one steroid at a time. Although the International Olympic Committee banned certain drugs in 1967 to protect the health of athletes and to ensure fair competition, steroids were not on the list. Because of conflicting results of early scientific studies, many physicians believed the drugs did not enhance athletic performance. Another reason steroids were not listed was that the IOC would have had no way to enforce a ban since no test for these substances existed at the time.

By the 1968 Olympic Games in Mexico City, anabolic steroid use had spread to sprinters, hurdlers, and middle-distance runners. Decathlon athlete Tom Waddell stated that he believed a third of all U.S. track and field athletes had used steroids at the training camp to prepare for these Olympics.

Although anabolic steroids were not banned, many athletes used them in secret rather than admit that performance-enhancing drugs had contributed to their success. Others saw no ethical problems with using the drugs. In 1971 American weight-lifting champion Ken Patera explained publicly why he was looking forward to competing against Russian super-heavyweight Vasily

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Alexeev in the 1972 Olympic Games: “Last year the only difference between me and him was I couldn’t afford his drug bill. Now I can. When I hit Munich I’ll weigh in at about 340 or maybe 350. Then we’ll see which are better, his steroids or mine.”

“At the 1972 Olympics, Jay Sylvester of the U.S. track-and-field team took an unofficial poll that revealed how wide-spread steroid use had become.” (pg. 7) Sixty-eight percent of the track and field athletes present told him they had used anabolic steroids in their training.” By the 1990s use had been reported in a long list of Olympic sports, including swimming, cycling, wrestling, handball, soccer, and winter sports.

### **Female Athletes Turn to Male Hormones**

While male athletes led the way in anabolic steroid use, female Olympians soon followed. The first reports of female athletes using male hormones came from the German Democratic Republic. Beginning in 1966 the GDR carried on a systematic sports-doping program in which scientists gave anabolic steroids to thousands of athletes—male and female, adolescent and adult—every year. This occurred in secret so that the rest of the world would not know that the success of the GDR athletes was drug assisted. The western world learned the details only after the fall of the GDR, when several classified documents came to light. Similar programs may have existed in other communist-bloc nations.

Doctors working for the government program began giving the drugs to females in preparation for the 1968 Olympic games. Over the next few years they increased the dosages to achieve greater results, but this also increased the masculinizing side effects. By the 1976 Olympics, these side effects had become so obvious that journalists asked the East German coach why his

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female swimmers' voices were so deep. He said simply, "We have come here to swim, not to sing."

"Since the female body naturally produces only small amounts of testosterone, female athletes who take anabolic steroids may experience more noticeable gains in muscle size and strength than males who take these drugs." (pg. 3) The athletic success of the East German women encouraged the spread of steroid use to women in order Eastern-bloc nations and, by the 1970s, to women in Western nations. The rise to Olympic success—and the large number of positive drug tests—of Chinese women during the 1990s has led to speculation that China may be carrying on a systematic sports-doping program. Adding to the suspicion is the fact that former East German coaches began working in China after the fall of the GDR.

### **Spread through Professional Sports**

Anabolic steroid use soon expanded from Olympic Sports to professional sports. These drugs may have infiltrated professional football via Alvin Roy, a Baton Rouge gym owner who had been an assistant coach for the U.S. Olympic weight-lifting team. In 1963 the San Diego Chargers hired Roy as the first professional football strength coach. Players reported that he gave Dianabol to most of the team. "He did not say that the pills were steroids, only that taking them would help us assimilate protein, 'the building blocks of muscle,'" said offensive guard Ron Mix. After taking the drugs for five weeks, another player sought advice from a neighbor who was a physician. The physician advised him against taking the drugs for an extended time. Mix said, "When the rest of us heard that, most stopped. But for many, the prospect of being stronger was too intoxicating, the hope for an advantage too enticing, the fear of failure too great; and they continued."

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“Use spread to other teams and was reportedly common in the NFL by the late 70s. Although spokesmen for the NFL denied that there was a problem, players told a different story.” (pg.1)

The drugs have been reported in other professional sports, including rugby and wrestling. Use in bodybuilding is so prevalent that many believe it is impossible to compete at the professional level without taking them. In 2002, when Ken Caminiti became the first retired MLB player to admit that half the players took them. Retired player Jose Canseco went further, estimating use at 85% of players.

### **College Athletes Mimic the Professionals**

Anabolic steroid use in college sports followed the pattern of the professionals. Steve Courson, former offensive lineman for the Pittsburgh Steelers and Tampa Bay Buccaneers, recalls the casual attitude toward anabolic steroids he encountered as a sophomore at the University of South Carolina in 1974. When an assistant coach suggested he try anabolic steroids, Courson asked one of the team physicians about the drugs. “This team doctor asked no questions. He simply took my blood pressure and handed me a prescription for 30 five milligram tablets of Dianabol.” The university paid for the prescription, per Courson.

The NCAA officially outlawed anabolic steroids in 1973, but it did not begin testing for the drugs until 1986. That year, more than twenty football players who tested positive were banned from playing in post-season bowl games.

Since 1989, the NCAA research team conducts an anonymous survey every after every four games. The purpose of this survey is to gauge the abundance of substance abuse among college athletes. The initial survey, back in 1989, showed that 5% of all college athletes use anabolic

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steroids. In 1997, however, the number dropped down to a mere 1%. Since then, it has essentially leveled out at about 1.5 percent.

The highest percentage of anabolic steroid use in men's sports in 2001 survey was in water polo, with 5 percent of athletes responding that they used the drugs. Rifle was second with 4.2 percent. Football was third with only 3 percent. The highest use among female athletes was in lacrosse (1.6 percent), followed by swimming (1.3 percent).

## Young Users

“Perhaps the most disturbing revelation for researchers conducting the study was the age at which anabolic steroid use begins. Some 57.2 percent of users said they began taking the drugs when they were in high school or younger. Rumors of high school use date to 1959, when members of a football team were reportedly given Dianabol by a Texas physician. In the early 1960s a high school football team physician secretly gave anabolic steroids to players as research for a pharmaceutical company.” (pg.3) When coaches from other teams complained, the program was stopped. In 1965 H. Kay Dooley of Pomona, California, conducted a study in which he gave three different brands of anabolic steroids to tenth and eleventh grade high school football players. He reported that these players experienced increased muscle size with no undesirable side effects, but his study was not controlled enough to reach definite conclusions.

The use of steroids expanded from football to other high school sports. From there, it spread to regular students who weren't even athletes; these students were under the impression that the steroids would help them to look different. The University of Michigan conducts a survey every year to gauge how much of their student body population is using. Their results were disheartening, as an increasingly high number of their students attested to using steroids.

### **Methods and Motives**

“Congress addressed the growing problem by passing the Anabolic Steroid Control Act of 1990, which made anabolic steroids a controlled substance. First-time possession could carry a penalty of up to a year in prison and a minimum fine of one thousand dollars.” (pg.4) Although this made it difficult for doctors or pharmacists to provide anabolic steroids for performance enhancement, most users were already getting these drugs illegally on the black market rather than by prescription. On the street, anabolic steroids are referred to by slang terms such as *juice*, *gym candy*, *pumpers*, *stackers*, and *weight trainers*.

The most common ways for athletes to ingest anabolic steroids are by injection, or by mouth. There are exceptions, however. Sometimes, the drug can be found in the form of skin patches, nasal sprays, or creams. People who use will typically take the drugs in cycles of anywhere from four to twelve weeks. They will then take a break, and then they will start another cycle. There are those, however, who use much more than others. They may never stop their cycle.

Beginning a cycle with a low dosage and then gradually increasing it until the middle of the cycle is reached (and then gradually decreasing use as the end of the cycle nears) is called “pyramiding”.

Users sometimes take other types of drugs along with anabolic steroids. Such a combination, called an array, may include other performance-enhancing drugs intended to counteract the side effects of anabolic steroid use. Examples include antiestrogens to prevent breast development in male users and human chorionic gonadotropin to prevent the testicles from shrinking.

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Anabolic steroids were never intended to be used and abused in the manner that they are today. There isn't a way to know exactly how many people use anabolic steroids, but the numbers from one survey suggest that more than 1 million people use in the United States alone.

Athletes who perform "strengthening sports" like weight lifting and football, use the steroids to bulk up. However, athletes who perform endurance sports like track and running use the steroids to lessen down time between injuries.

A growing group, which include actors, musicians, models, and high school students, take these drugs to improve their appearance. Some bodyguards, construction workers, bouncers, policemen, and soldiers believe anabolic steroids will enhance their job performance.

Despite the seeming benefits, doctors have warned for years about the dangers of anabolic steroid abuse. Many users did not take the warnings seriously because some of these same doctors asserted that anabolic steroids did not build muscle and that any weight gains users experienced were the result of water retention or the power of suggestion. Researchers who later reopened the issue discovered the true link anabolic steroids and athletic performance.

## Use and Abuse

During the 1960s and 1970s, when anabolic steroid use was sweeping through sport after sport, researchers conducted studies to determine how these drugs affect athletic performance.

Although some studies showed increased muscle size and strength in subjects who used anabolic steroids, others did not. The conflicting results led many physicians to conclude that anabolic steroid use does not build muscle.

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This positing conflicted with the testimony of the athletes, as Shalender Bhasin of the University of California, Los Angeles, learned when he began his career in the 1980s. he asked, “How could athletes and recreational bodybuilders and sports medicine physicians believe so fervently that these compounds have anabolic effects—and that was consistent with the widespread, growing abuse of these compounds—and how could the academic community have the completely opposite view of it?” Bhasin and other researchers reexamined the issue. Their search for answers not only revealed the true effects of anabolic steroids on the body but also renewed interest in finding medical applications for these drugs.

Athletes who experimented with anabolic steroids in the 1950s quickly experienced significant gains in muscle size and strength. In the years that followed, bodybuilders attained physiques that were much more muscular than those of body-builders in the pre-steroid era. Weight lifters football players, and other strength athletes reported increases in muscle mass and other strength athletes reported increases in muscle mass and in the amount of weight they could lift. Track and athletes believed that anabolic steroids were responsible for the strength gains that allowed them to put the shot or throw the discus, hammer, or javelin farther.

Although the GDR kept its sports-doping program hidden from the rest of the world, its doctors “recorded the performance improvements that GDR athletes experienced when taking anabolic steroids. These improvements were especially significant in adolescent and female athletes. In the first documented case of a female athlete using anabolic steroids, GDR doctors reported that she could put the shot 7 feet farther, after taking the drugs for only eleven weeks.” (pg.2)

## Widespread Confusion

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Meanwhile, based on the results of early studies, some researchers asserted that anabolic steroids were ineffective for performance enhancement. The lack of scientific evidence caused much debate in the 1960s. Since many athletes did not believe physicians' claims that anabolic steroids failed to build muscle, they also did not believe these physicians' claims that the drugs caused dangerous side effects. Adding to the confusion was the fact that no supporting organization had yet banned anabolic steroids. Dave Maggard, a University of California track team coach and a former Olympic shot putter, expressed his frustration in 1969: "What I wish is that some reputable scientific group would really study certain drugs and tell us yes or no as to whether they are effective, and yes or no as to whether they are dangerous."

Even after sporting organizations banned anabolic steroids, confusion prevailed over the effectiveness and health consequences of these drugs. In 1977 the American college of Sports Medicine (ACSM) declared in a position statement that anabolic steroids do not enhance athletic performance. Former NFL offensive lineman Steve Courson expressed his reaction to such claims:

"Anyone who used them knew what a load of shinola that was. It was evident to me—and to anyone who observed me over a month's time—that these things worked remarkably well. Nor did I see any damaging health effects in myself or my peers. Perhaps if guys were dropping like flies in practice, I might have rethought my position. But back then there seemed to be only enormous benefits and few, if any, drawbacks."

The ACSM changed its position in 1984, but by then the medical community had lost credibility with athletes who had experienced the performance-enhancing effects of anabolic steroids.

### *Reexamining the Question*

## Athletes and Steroid Use

In the 1980s researchers reviewed the earlier studies and identified several flaws responsible for the conflicting results. By neglecting to control the diet of study subjects or by using small doses of anabolic steroids, some studies failed to recreate the conditions under which athletes train on steroids. Some studies used subjects who were inexperienced with weight training. Since inexperienced people usually make much greater gains when they first begin weight training, whether or not they use anabolic steroids, this factor could obscure the differences in results between study subjects who were given anabolic steroids and the subjects that were given a placebo.

Studies are also limited by ethical concerns (Castrucci, 2004). Some athletes take anabolic steroids in potentially dangerous doses or in combinations that no researcher could in good conscience give to study subjects, so studies cannot recreate the experiences of these athletes. The irreversible masculinizing effects are another concern. Since researchers consider it unethical to give anabolic steroids to women and children, studies were limited to adult male subjects. Little was known about these drugs' effects on women and children after the fall of the GDR in 1990. Formerly classified documents detailing the government's sports-doping program revealed not only severe side effects in women and children but also the great increases in athletic performance.

Ethical concerns still apply, but researchers who reexamined the link between anabolic steroids and athletic performance could overcome some of the other problems of earlier studies. A 1996 study and his colleagues used only subjects who were experienced weight lifters and divided them into four groups (Sue, 2007). Two groups were given testosterone, but only one of these groups were given a placebo they thought was testosterone, and one placebo group exercised.

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This ten-week study, which was longer than most earlier studies, controlled subjects' diets and types of exercise and used a dose of testosterone higher than that used in previous studies.

The group that took testosterone and exercised showed much greater gains in muscle size and strength than the other three groups. The group that took testosterone but did not exercise gained more muscle mass and almost as much muscle strength as the placebo group that exercised. This and other studies have led most researchers to agree that anabolic steroids, when taken along with a proper diet, increase muscle size and strength (Castrucci, 2004).

## How Anabolic Steroids Build Muscle

“Researchers hypothesize that anabolic steroids trigger these changes by increasing protein synthesis in muscle cells. Hormones and other chemical messengers relay instructions when they bind to receptor sites on cells. Anabolic steroids bind to testosterone receptors on cells and send a signal for the cell to produce more protein.” (pg.1) “They work very work much like a lock and key to cause muscles to increase the amount of protein they make, explains Thomas D. Fahey of California State University, Chico.

Recent research by Bhasin and his associates has led to another hypothesis. The researchers noted that anabolic steroids seem to decrease fat mass along with increasing muscle mass. After a series of experiments, they concluded that anabolic steroids affect several cell types, including stem cells, which have the potential to become different kinds of cells. When testosterone binds to receptors on these cells, it may signal them to form muscle precursor cells, which then fuse together to increase the size of existing muscle fiber. Per Bhasin, “Although the data are still emerging, our initial findings suggest that androgens promote stem cells to differentiate in a way

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that increases formation of muscle cells and inhibits formation of fat cells. So you get more muscle and less fat.”

Another possible effect of anabolic steroids is interference with a group of naturally-produced steroids called glucocorticoids. Glucocorticoids are catabolic, meaning they break down muscle. The body secretes them during exercise or other stress to burn protein for fuel and to fight inflammation. Fahey explains, “When you lift weights, you have two processes that are initiated. You’re going to have a muscle-building process and a muscle- breakdown process.” “Some researchers think that anabolic steroids bind to receptors for glucocorticoids. The glucocorticoids are blocked from their receptors and from sending the signal to break down muscle. This would lead to a quicker recovery time between workouts and would explain why most athletes on anabolic steroids claim that they can work out more frequently and intensely.” (pg. 1)

Anabolic steroids could also have an indirect effect on muscles by increasing aggression so that athletes train harder. Although increased aggression has been difficult to demonstrate in studies, athletes commonly report this side effect.

The effects of anabolic steroids on body composition are not permanent. When users stop taking the drugs, they lose their steroid-induced muscle gains. One factor overlooked by many users is that the testosterone they take into their bodies suppresses their natural production. “When they stop taking testosterone, their levels are actually lower than where they started, and it takes a long time for their own body to recover testosterone production,” Bhasin points out. These abnormally low testosterone levels could allow faster loss of muscle gains and could cause a hormonal depression. These factors sometimes lead to psychological dependence on the drugs.

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A 2004 study by researchers at Harvard Medical School indicates that the medical community has not regained its credibility with athletes who use anabolic steroids. Researchers interviewed eighty weight lifters, forty-three of whom were anabolic steroid users and thirty-seven of whom were nonusers, and asked them to rate their trust in physicians' knowledge of various health-related issues (NCAA, 2012). Both users and nonusers gave doctors similar high ratings in areas of health and disease, cigarette smoking, and use of alcohol and street drugs. When it came to anabolic steroids, however, users rated doctors' knowledge much lower than nonusers did.

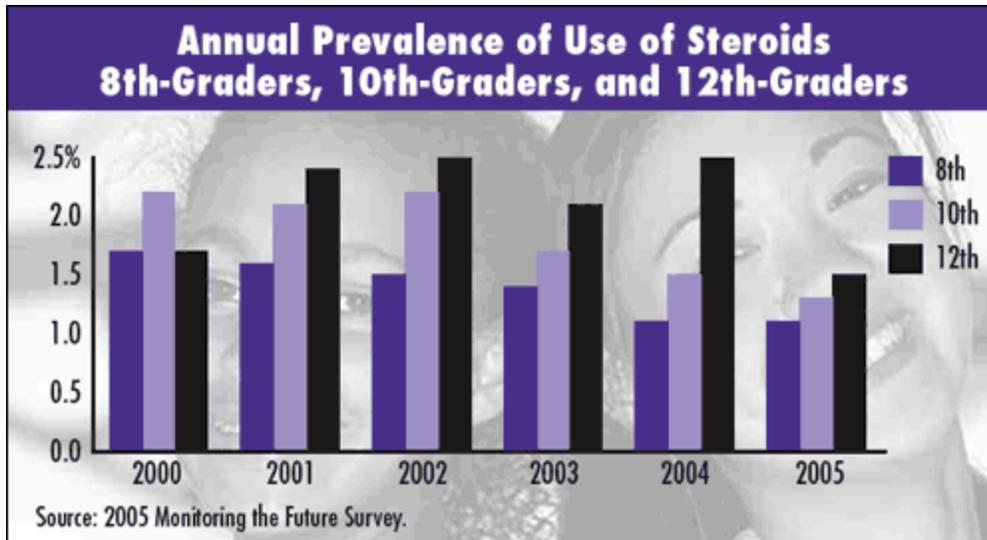
The authors believed the lack of trust in physicians stemmed from the medical community's long term denial that anabolic steroids build muscle and from the perception that physicians do not understand the "body-body lifestyle." They concluded "These 'attitude problems' among AAS users may have serious public-health consequences, because they compromise the ability of professionals to study, educate, or treat these individuals."

## Identifying Users

Because anabolic steroids allow users to develop a degree of muscularity not possible without drugs, the trained eye can identify users by their appearance. After studying hundreds of subjects, both users and nonusers, Harrison G. Pope Jr. of McLean Hospital and his colleagues believe they have identified the upper limit of muscularity possible for a nonuser and that men who exceed this limit have almost certainly used anabolic steroids. The researchers calculate muscularity with a formula that uses the person's height, weight, and body-fat percentage.

Another sign of anabolic steroids use is disproportionate upper body mass. Since anabolic steroids have the greatest effect in the upper body, users' shoulders, necks, and chest muscles may look unnaturally large compared with other areas of the body.

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## Anabolic Effects Applied to Medicine

“Despite the long-standing debate over the anabolic effects of these drugs, they have been used for decades to treat patients suffering from wasting conditions. Doctors prescribe anabolic steroids to promote healing in burn or trauma victims and to strengthen weak patients before and after surgery or after radiation therapy. Patients treated with anabolic steroids have gained muscle mass and strength and have reported improved appetite and sense of well-being.” (pg.1)

The confirmation during the 1980s and 1990s that anabolic steroids build muscle has led to renewed interest in developing versions more appropriate for use in patients afflicted with wasting diseases such as AIDS or cancer and in elderly people. Bhasin says, “If we can increase their muscle mass and strength and increase their mobility, it can make all the difference between being completely dependent or bedridden and being independent. And that can make a huge difference in both quality of life and the cost of caring for these individuals.” Since evidence indicates that anabolic steroids can adversely affect the heart and prostate, researchers are trying to develop versions with anabolic properties but without these adverse effects (NCAA, 2012).

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### Useful effects on Hormone and Sperm Levels

The earliest medical use for synthetic anabolic steroids was treatment of hypogonadism, a condition in which the body does not produce enough testosterone. Physicians continue to prescribe anabolic steroids for this purpose. As replacement therapy, these drugs raise testosterone levels to normal and allow patients to develop or maintain male sexual characteristics and normal muscle size.

“Studies conducted in the 1990s have led to increased use of anabolic steroids as replacement therapy in healthy older men, whose bodies produce less testosterone because of age. At the other end of the spectrum, boys aged fifteen or older who have not entered puberty are treated with anabolic steroids for six months. The drugs trigger puberty to begin, after which the boys’ bodies begin producing normal amounts of testosterone” (pg. 3).

The effect of anabolic steroids on sperm levels has resulted in other medical applications. Higher than normal levels of testosterone in the male body led to suppression of sperm production, and these drugs have been successfully tested as a male contraceptive. The effect is reversible when use is discontinued. On the other hand, the drugs can help restore fertility in men with low sperm counts. These men are given high doses of anabolic steroids to suppress their sperm production for several months. When they stop taking the drugs, a rebound effect often causes their natural sperm production to increase to levels higher than before.

### Other Medical Application

Anabolic steroids have limited medical applications in women. Beginning in the 1940s, these drugs were given to women with advanced estrogen and shrink the tumors. Other drugs without

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the masculinizing side effects are now used for this purpose (Sue, 2007). Anabolic steroids with weaker androgenic effects are sometimes used to treat endometriosis, a condition in which tissue lining the uterus grows in other parts of the body and can cause pain, bleeding, and infertility.

Anabolic steroids help control this condition by reducing levels of female hormones.

In both men and women with hereditary angioedema, a disorder in which sufferers experience attacks of swelling in the face, limbs, hands, feet, intestines, or airway, anabolic steroids help prevent such attacks. Hereditary angioedema can be life-threatening since the airway may swell shut. Anabolic steroids are also prescribed to treat rare forms of anemia, although newer drugs are more commonly used for this purpose.

“An early medical application for anabolic steroids was treatment of depression, but by the 1950s they were largely replaced with other drugs and electroshock therapy. Recent studies have renewed interest in psychiatric use by demonstrating that anabolic steroids may be an effective tool for treating depression in men who do not respond to conventional antidepressants and in men infected with HIV.” (pg.1) Anabolic steroids have some medical application for animals as for humans. Veterinarians prescribe anabolic steroids to improve appetite and strength in older animals and in animals that have been weakened by surgery or illness. Some types are given to cattle to increase their weight gain. As in humans, the drugs are often used in race-horses for performance enhancement. Many of the anabolic steroids humans purchase on the black market were produced for veterinary use.

## Corticosteroids

Because of the public attention anabolic steroids receive, many people automatically think of them when they hear the term “steroids”. Anabolic steroids are only one group of the compounds

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known as steroids (Lisha, 2010). Other groups of steroids, including glucocorticoids and female hormones, are not anabolic. These also have synthetic counterparts that physicians prescribe for medical problems.

The most commonly prescribed steroids are corticosteroids, such as cortisone and prednisone. These are synthetic versions of glucocorticoids, which naturally are produced by the adrenal glands. Rather than build muscle, these catabolic steroids break down tissue and fight inflammation.

Doctors discovered the anti-inflammatory effect of cortisone in 1948, when they used it to treat a twenty-nine-year-old woman who was immobilized with severe rheumatoid arthritis. After two cortisone injections, her pain and swelling decreased and she could walk. Other arthritis patients treated with the new drug likewise experienced remarkable results. Three researchers whose work led to this medical breakthrough were awarded the Nobel Prize for physiology and medicine in 1950.

Because of cortisone's early success, many viewed it as a miracle drug. Over time, however, side effects became evident in patients who took high doses for extended periods. Corticosteroids increase the risk of high blood pressure by making the body retain water and salt. Because they cause calcium loss from bones, these drugs put older adults at increased risk for osteoporosis. They also increase blood sugar, making it difficult for diabetes to control their disease. Patients who contract chicken pox or measles may find that corticosteroid use makes the infection more serious. In children, long-term use may slow growth, but it is unknown whether this affects final adult height.

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The medical benefits of corticosteroid treatment led doctors to develop strategies for reducing the side effects. Some patients can take lower doses for shorter periods of time. Exercise and diet help counteract weight gain and the risk of osteoporosis in patients who must take the drugs for extended periods.

Patient fear of corticosteroid side effects is only one factor that led to the coining of the term steroidophobia. Another is the amount of media attention given to the negative effects of anabolic steroids. Many patients confuse the two types of steroids and resist the idea of any steroid treatment. David B. Allen of the University of Wisconsin's Children's Hospital says, "We have heard about the perception that steroids are bad. And our patients definitely have this perception. When we talk about using these medications for their children, they don't know that we're not talking about anabolic steroids, or what they're reading about on the grocery store shelf. It's quite confusing." (Lisha, 2010) He recommends that health care professionals take time to educate their patients about the difference between anabolic steroids and corticosteroids.

Dozens of corticosteroids are available for medical use today. Besides arthritis inflammation, the drugs are used to treat such problems as asthma, allergies, lupus, and muscle strains and to prevent rejection of transplanted organs. Corticosteroids are prescribed as replacement therapy for patients with Addison's disease, a rare but life-threatening disease in which the adrenal glands do not produce enough glucocorticoids (Green, 2001).

## Female Hormones

Another group of steroids includes the female hormones estrogen and progesterone. The female's body natural production of estrogen is reduced at menopause, which leads to symptoms such as hot flashes, sweating, and vaginal discomfort. Doctors prescribe synthetic estrogen as

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replacement therapy to alleviate these symptoms and to prevent osteoporosis. The side effects of taking estrogen may include increased risk of breast cancer, heart attack, stroke, and blood clots. Progestin is combined with estrogen in hormone replacement therapy to decrease the risk of uterine cancer.

Doctors also prescribe combination of estrogen and progestin in the form of oral contraceptives. On its own, progestin in the form of oral contraceptives (Lisha, 2010). On its own, progestin can also be used as a contraceptive as a contraceptive, to regulate menstrual cycles, or to help a woman become pregnant and maintain the pregnancy when her body does not produce enough of this hormone. Progestin helps increase appetite and weight gain in cancer or AIDS patients and helps stop tumor growth in patients with breast, kidney, or uterine cancer. Estrogen also helps fight certain types of cancer in both men and women.

Doctors prescribe female hormones, corticosteroids, and, in rare cases, anabolic steroids when they believe the medical benefits outweigh the danger from side effects. Most anabolic steroid users, however, take these illegally for performance enhancement or appearance, with no medical justification for the risk. That risk includes a wide range of side effects, some known, others suspected. Anabolic steroids have a dark side that cannot be ignored.

A long list of side effects is attributed to anabolic steroids, but this list is accompanied by much debate. While some side effects are well documented, much remains unknown about the long-term health hazards. Some researchers believe that the media has contributed to the confusion by publishing sensational reports that exaggerate the risks. (NCAA, 2012).

Meanwhile, many users pay a high price for ignoring those risks.

### *The Effects on Female Users*

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The effects of anabolic steroids on physical appearance are well-known. As the primary male hormone, testosterone is responsible for development of secondary male sexual characteristics. The increase in testosterone that males experience at puberty accounts for many of the physical differences between males and females (Green, 2001). Females who take anabolic steroids to build muscle also experience the other masculinizing effects of these drugs, including a deepened voice, growth of facial and body hair, loss of scalp hair, an enlarged clitoris, and an increase in libido. These effects may be irreversible.

Although the masculinizing effects on females were evident when anabolic steroids were first used in medicine in the 1930s that did not stop female athletes from later using these drugs for performance enhancement. “Since the adult female body normally produces only .3 milligrams of testosterone a day, compared with 7 milligrams a day produced by the adult male body, anabolic steroid use can make a marketed difference in muscle size and strength for female users.” (pg.3) For this reason, the government-sponsored sports-doping program in the German Democratic Republic emphasized administering anabolic steroids to women and adolescent girls.

After the fall of the GDR in 1990, more than 150 formerly classified government documents confirmed the existence of the doping program and revealed its extent beginning in 1966 thousands of athletes were given anabolic steroids each year (Green, 2001). The age at which steroid administration began depended on the sport, but female swimmers aged fourteen or younger and fourteen to fifteen year old males and females in some other sports were treated with male hormones, without the knowledge of their parents. The athletes, physicians, and coaches involved were sworn to secrecy. In some cases, athletes were given experimental drugs that had not been approved for use in humans (Calhoun, 2000). The users included many world-record holders and Olympic medalists.

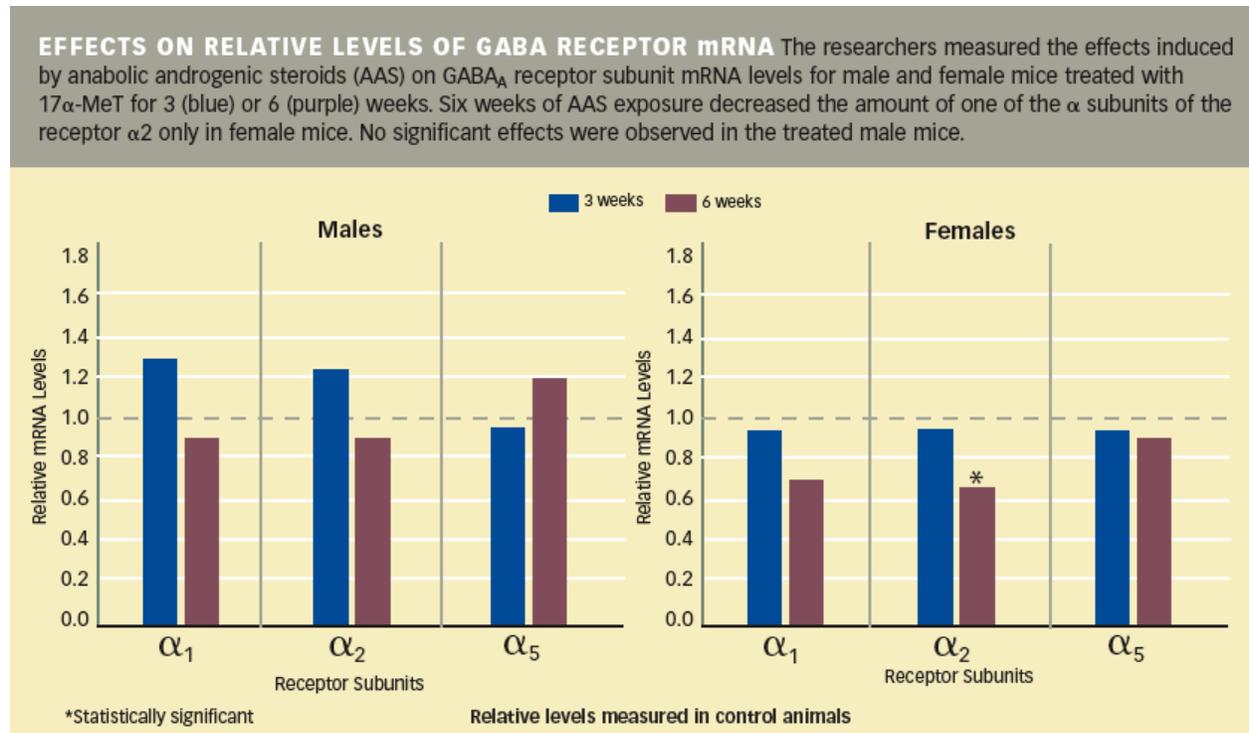
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The documents reported severe masculinizing effects in female users. Many of the doctors involved stated that it was unethical to administer male hormones to females, but they followed the government's instructions. In 1977 Manfred Hoppner reported to the government, "In numerous women the prevailing and administration of anabolic hormones has resulted in irreversible damages, in particular in the swimming events, for example signs of virilization such as an increased growth of bodily hair (hirsutism), voice changes and disturbances in libido." He related the case of a two-time gold medal winner whose voice had deepened to the point that she could no longer perform her work as an interpreter.

Females athletes who were troubled by the masculinizing side effects were not allowed to stop taking the drugs. Hoppner reported on his examination of a teenage sprinter who was a world-record holder: "The legs including the inner parts of the thigh are strongly hirsute and the pubic hair extends already to the navel. She is forced to shave." The sprinter had been given anabolic steroids since age fifteen by her coach who told her they were vitamin tablets. When she recognized from the side effects that she was taking anabolic steroids, she decided to give up her sprinting career but was told she would be expelled from school and lose all support. Although Hoppner arranged permission for her to graduate, this was an exception.

Many female athletes in the program experienced gynecological problems, such as ovarian cysts. Because doctors believed that anabolic steroid use by the mother could cause birth defects in early pregnancy, female athletes were given oral contraceptive pills. If an athlete pregnant, an abortion was ordered (Buckman, 2008).

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### *Testosterone Overload*

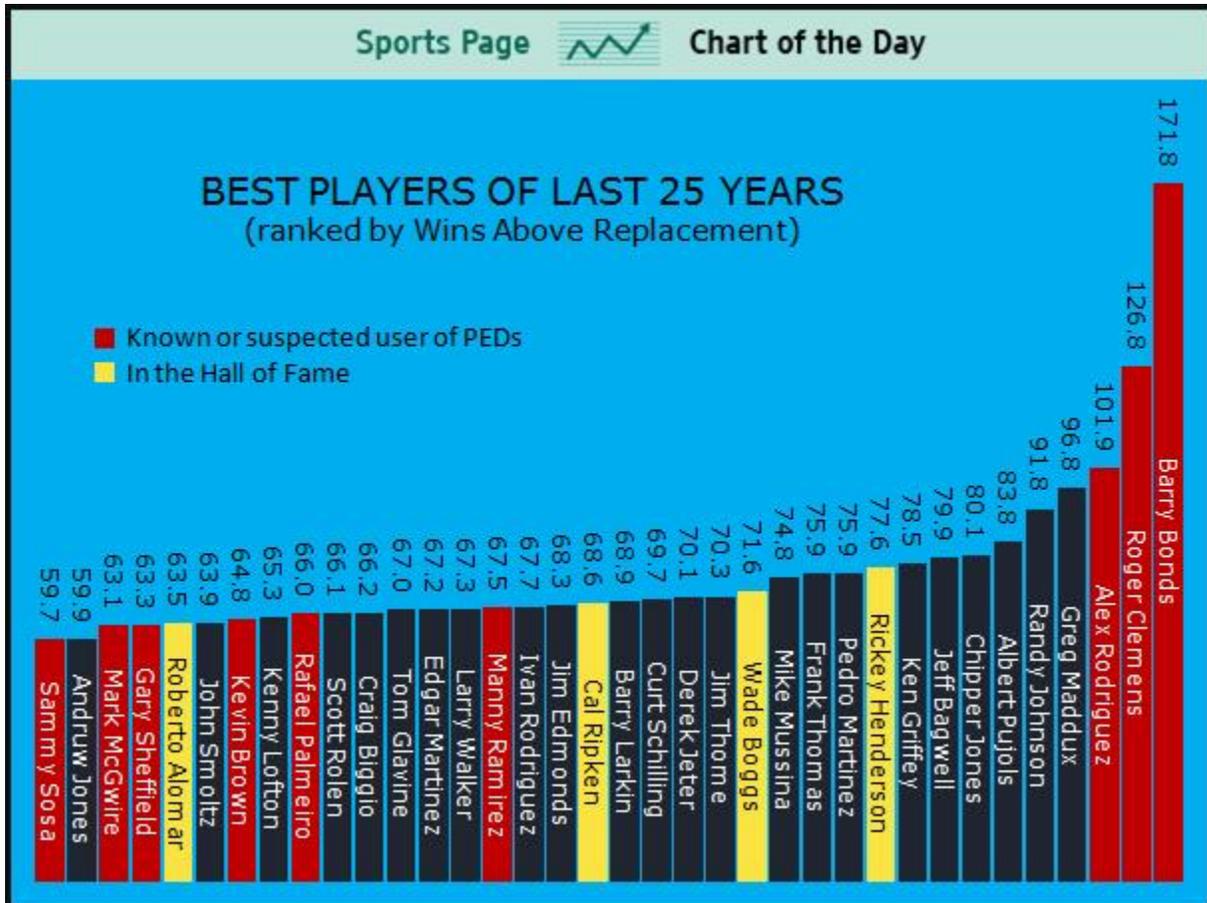
While anabolic steroids masculinize women, they have the ironic effect of causing feminizing changes in men. A male body overloaded with testosterone converts some of the excess testosterone into the female hormone estrogen (Blair, 2012). Thus, male steroid users may develop gynecomastia, an abnormal enlargement of breast tissue.

### **Conclusion**

Steroid use is very common in the world of professional athletics. Sadly, it is also prevalent in collegiate level sports as well. Though there are undoubtedly some good uses for steroids, as have been mentioned, abusing them to gain a competitive edge is never the way to go. When the desired outcome is achieved, the results are always short lived. Sports organizations have

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cracked down on anabolic steroid use, anyway, so there is a high likelihood of getting caught and derailing one's entire career.



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