

DOPING SCANDALS OVERSHADOW SPORTS ACHIEVEMENTS

As the 2009 Major League Baseball season got under way, some of the biggest headlines were made off the field. Instead of hitters' RBIs or pitchers' ERAs, the focus was on a different acronym: PEDs, short for performance-enhancing drugs.

In February, New York Yankees slugger Alex Rodriguez admitted to using banned substances from 2001-2003, a period in which he earned a record-setting salary and won an American League most valuable player award. In May, Los Angeles Dodgers outfielder Manny Ramirez was banned for 50 games for violating baseball's drug policy.

Less than a week later, former pitcher Roger Clemens – considered among the all-time greats – went on ESPN to again refute allegations that he used PEDs.

The seemingly endless PED scandals have left fans of baseball and other sports questioning the validity of outstanding athletic achievements. To add to the public's confusion, the particular drugs, their history, the penalty for their use and the testing methods used to detect them differ from sport to sport.

PED use, also known as doping, is certainly not new. Amphetamines, originally used by soldiers and airmen during World War II, were among the first illicit drugs taken by athletes.



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Amphetamines, or "speed," increase energy levels even after fatigue sets in. In the 1960s, cyclists Tom Simpson and Knud Enemark Jensen died during competitions, with amphetamines later found in their bloodstreams. Their deaths led to cycling becoming the first sport to initiate drug testing.

Anabolic steroids came next. During the 1950s and 1960s, Eastern Bloc countries gave anabolic steroids to their athletes. By the 1970s, steroids had made their way to the United States, becoming popular in the National Football League.

Anabolic steroids cause an increase in muscle mass and strength. With prolonged use, however, they can have a negative

AS FANS QUESTION THE LEGITIMACY OF THEIR SPORTS HEROES' ACCOMPLISHMENTS, SPORTING AGENCIES STRUGGLE TO DEVELOP EFFECTIVE DRUG-TESTING POLICIES AND PROCEDURES.

effect on muscle and result in heart disease and tendon ruptures. They also can influence hormonal levels, causing acne, secondary sex characteristic changes and violent behavior. Steroid abuse also has been associated with cancer: NFL defensive end Lyle Alzado, who died in 1992, blamed his incurable brain cancer on long-term use of anabolic steroids.

In 2003, former baseball player Ken Caminiti admitted to using steroids during the 1996 season, when he was named the National League

most valuable player. At the time, Caminiti estimated that as many as half of all major leaguers were using steroids.

The exact percentage may never be known, but Major League Baseball conducted a 20-month investigation into the use of PEDs. It culminated with the December 2007 release of the Mitchell Report. Some of the game's biggest names were among 89 current or former players identified as having used steroids or drugs, including Clemens, Jason Giambi and home run king Barry Bonds.

The Mitchell Report also detailed the abuse of another drug, human growth hormone. HGH increases protein synthesis, resulting in increased muscle mass, and may improve resistance to injury. Andy Pettitte, a pitcher for the Yankees, said that he took HGH so he could recover from an elbow injury faster.

HGH also carries big risks. It has been shown to increase the size of the digits and skull bones, for instance. Breast, prostatic and colorectal cancer rates are higher in individuals with high

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levels of HGH.

For endurance athletes who dope, erythropoietin (ah-rith-ro-poy-tin), or EPO, has become the drug of choice. EPO is a hormone that boosts the formation of red blood cells, improving the oxygen-carrying capacity of the blood. It is commonly prescribed to counter the side effects of chemotherapy.

But as red blood cell concentration increases, so does blood thickness. EPO has been tied to several deaths of endurance athletes, whose hearts were unable to pump their sludge-like blood.

Besides the bodily damage, the psychological effects of PED abuse can have terrible consequences. Long-term steroid abuse can result in “roid rage,” which was thought to be a factor in 2007 when professional wrestler Chris Benoit killed his wife and their 7-year-old son before taking his own life.

Some researchers have suggested that athletes who dope are more prone to addiction to recreational drugs. Tour de France cyclist Marco Pantani, whose career was clouded by doping allegations, died from a cocaine overdose in February 2004. Six months later, baseball’s Caminiti died from an acute cocaine and opiate overdose.

As fans question the legitimacy of their sports heroes’ accomplishments, sporting agencies struggle to develop effective drug-testing policies and procedures. The lack of a universal anti-doping code may be part of the problem. Olympic sports use the independent World Anti-Doping Association (WADA) to drug test and sanction their athletes. However, the National Football League, Major

League Baseball, National Hockey League and National Basketball Association all test and punish their own athletes. Each of these sports leagues has different testing protocols, including how often surprise drug tests can be given and how they are administered. For instance, the NHL doesn’t even test its athletes during the playoffs.

Doping penalties also vary by sport and governing body. Athletes who test positive for a banned substance for the first time face a two-year ban from WADA but only a four-game suspension from the NFL. A second positive test may result in a lifetime ban from WADA but only an eight-game suspension from the NFL.

The lack of consistent testing and punishment sends a confusing message to the public about the true magnitude of doping in sports. As the public increasingly demands athletes who are outstanding but also free of PEDs, sports agencies are forced to begin a new age of enforcement.

Perhaps fewer athletes will be tempted to experiment with PEDs as the consequences of getting caught become more severe and as the health risks become more evident. Meanwhile, the cheaters will continue to cast a dark shadow on their sports and the athletes who participate in them.

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– Article by Rich Willy

Q&A

PED USE

WHAT ARE THE DIFFERENT TYPES OF PERFORMANCE-ENHANCING DRUGS (PEDS)?

There are several categories. The most common ones build lean body mass. These include anabolic steroids (related to the hormone testosterone) and human growth hormone, along with their precursors. These accelerate the development of muscle tissue while they reduce fat tissue. When the goal is to prevent fatigue and sustain performance, stimulants such as caffeine and various amphetamines have been used. For athletes who desire a greater tolerance to pain, painkillers ranging from non-steroidal anti-inflammatory drugs to narcotics may be used. Sedatives, such as beta-blockers, are used in sports that require steady hands and precision, such as hunting and archery. Diuretics are used when weight loss is desired, as in wrestling.

HOW ARE THEY TAKEN?

Performance-enhancing drugs can be taken orally, injected intramuscularly or given transdermally. Injectable forms are less harmful to the liver, but oral dosing is cleared more quickly by the body and therefore harder to detect.

HOW DO THEY WORK?

Androgen receptors in muscle tissue regulate the transcription of controller genes. These genes control the accumulation of DNA needed for muscle growth. Increasing the sensitivity of androgen receptors, as well as increasing the overall levels of androgen, can increase muscle protein synthesis. This results in increased muscle mass.

HOW PREVALENT IS PED USE?

Between 1 and 3 million Americans have used steroids illegally. Steroid use is most common in young adults. At the high school level, an estimated 4 to 12 percent of boys and up

to 3 percent of girls have tried PEDs. At the college level, the National Collegiate Athletic Association found a 1.1 percent usage rate among all athletes. About half of these users report performance enhancement as the reason; the other half say it is to help recover from an injury. There appears to be an inverse relationship with academic performance, with below-average students being more likely to use. Factors such as age, race and ethnicity do not have clear relationships to PED use.

WHAT ARE THE ADVERSE EFFECTS?

Recent studies have identified five categories: hepatic, cardiovascular, reproductive/endocrine, dermatological, and psychiatric. Liver toxicity has been identified by a number of studies. At the cardiovascular level, there are increased risks for hypertension, heart attacks, cardiomyopathy and sudden cardiac death. In terms of the reproductive and endocrine systems, there is an increased risk in men for testicular atrophy, decreased sperm count, higher voice pitch, among other issues. For women, unusual hair growth, a deeper voice, decreased menstruation and clitoral hypertrophy have been noted. Dermatologically, severe acne and baldness have been observed. Psychologically, PED use has been linked to depression, aggressiveness and mania.

WHAT ARE THE INDICATORS THAT YOUR PATIENTS MIGHT BE ABUSING STEROIDS?

In males, the symptoms of abuse include rapid muscle gains, aggressive and violent temperament, severe acne, premature balding and breast development. In females, indicators include increased body hair, voice deepening, abnormal jaw development and a reduction in breast size. 📌

– Article by Joaquin Barrios

CASE STUDIES

HARD BODIES ON STEROIDS SUSCEPTIBLE TO SOFT-TISSUE INJURIES

Tendon and ligament injuries are a known consequence of prolonged anabolic steroid use. However, only a handful of published reports in the medical literature have described tendon and ligament injuries associated with the use of performance-enhancing drugs. Four case studies – each involving bodybuilders – are presented here as examples of the injuries that can occur. The first two involve the upper extremity, the second two the lower extremity.

CASE 1

A 41-year-old bodybuilder injured his shoulder during a 40-kilogram bench press. The patient described an audible “snap” in his shoulder and subsequent pain in the shoulder girdle with movement. On physical examination, obvious swelling of the teres major muscle belly was evident. A disruption of the tendon could be palpated easily, resulting in a diagnosis of a teres major tendon rupture. The teres major contributes to medial shoulder rotation and adduction, two motions associated with a bench press. With additional questioning, it became evident that long-term anabolic steroid use led to weakening of this muscle and eventual rupture. Physiotherapy and oral anti-inflammatory tablets were prescribed. After three months, the patient was asymptomatic.

Davies, J.P., Shenolikar, A., Graham, G. “Rupture of the teres major tendon associated with anabolic steroid use,” *Sports Exercise & Injury*, 1998, 4:210-211.



Weightlifters are susceptible to serious soft-tissue injuries when using anabolic steroids because of the high loads imparted on the weakened tissues.

CASE 2

A 40-year-old bodybuilder presented with a swollen right elbow after a weight-lifting session. A “snap” at his elbow prevented him from continuing to exercise. The elbow was swollen and tender to palpation at the olecranon insertion. The patient was unable to actively extend his elbow. Plain radiographs revealed swelling and an avulsion fracture of an olecranon traction spur. He reported that he had been taking steroids by injection for approximately five years. The injury required surgical repair of the tendon and the olecranon process.

Faraj, A.A. “Triceps tendon rupture in a weight lifter on anabolic steroid,” *Sports Exercise & Injury*, 1998, 4:140-141.

CASE 3

This case, involving a 22-year-old bodybuilder, was the first report linking ligament rupture with anabolic steroid use. He presented with complaints of knee pain after stumbling over a couple of steps. A small effusion was present. Clinical ligament tests were conducted after the patient reported several episodes of giving way. An isolated positive Lachmann’s test was found, although the anterior drawer was negative. Upon direct questioning, he admitted to having undergone an eight-week regimen of oxymethalone. Knee arthroscopy revealed a complete rupture of the anterior cruciate ligament, as well as intercondylar

synovitis. He chose to forego surgery for a regimen of physical therapy. One year later, he continued to report episodes of giving way.

Freeman, B.J.C., Rooker, G.D. “Spontaneous rupture of the anterior cruciate ligament after anabolic steroids,” *British Journal of Sports Medicine*, 1995, 29:274-275.

CASE 4

A 29-year-old bodybuilder presented with pain and swelling in his knees after jumping from a height of 15 feet. He reported landing on both feet with his knees flexed. Upon evaluation, palpable gaps were noted above the superior pole of his patella bilaterally. He was unable to perform a straight leg raise or extend his knees. He reported a history of quadriceps tendon pain prior to the injury. A diagnosis of bilateral quadriceps tendon rupture was made. The patient admitted to a combined steroid regimen of stanozolol, nandrolone decanoate, methandrostenolone and clenbutarol. The injury required operative repair using sutures, followed by an eight-week immobilization period.

Liow, R.Y., Tavares, S. “Bilateral rupture of the quadriceps tendon associated with anabolic steroids,” *British Journal of Sports Medicine*, 1995, 29:77-79.

Based upon these four cases, it is clear that weightlifters are susceptible to serious soft-tissue injuries when using anabolic steroids because of the high loads imparted on the weakened tissues. Education is the key to preventing such serious injuries in these athletes. 📌

– Article by Joaquin Barrios

RESEARCH ABSTRACT

STEROID USE AND FOOTBALL INJURIES



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Horn, S., Gregory, P., Guskiewicz, K. "Self-reported anabolic-androgenic steroids use and musculoskeletal injuries." *American Journal of Physical & Medical Rehabilitation*, 2009;88,192-200.

BACKGROUND

Anabolic steroid use dates to the early 1950s. Users are attracted by the ability to build muscle and size quickly while taking steroids. Despite a number of highly publicized cases involving famous athletes, the prevalence of steroid use in the sports world is not known.

Animal studies have suggested that anabolic steroids may affect tendon elasticity, placing it at greater risk of injury. However, the association between steroid use and musculoskeletal injury has not been documented beyond case studies. The purpose of this study was to document the use of steroids among professional football players and to assess the incidence of musculoskeletal injuries in these athletes.

PROCEDURES

The authors sent a health questionnaire to all living retired professional football players who had played for at least two years (n=3,683). The participants were asked whether they ever used performance-enhancing steroids and about any musculoskeletal injuries they sustained while playing football that required medical attention. Individuals who did not initially respond were mailed another questionnaire. Non-responders then were contacted by phone several times.



The highest percentages of steroid use were among offensive and defensive line players.

RESULTS AND DISCUSSION

The authors reported that 2,532 players responded, for a 70 percent response rate.

- On average, respondents were 53 years old and played seven years of professional football.
- A total of 233 (9 percent) of respondents reported having used anabolic steroids during their professional careers. The highest reported prevalence was in those who played during the 1980s (20 percent).
- Anabolic steroid users were more likely to have had a body mass index greater than 30.
- The use of anabolic steroids was associated with the position played. The highest percentages were seen among offensive line players (15 percent) and defensive line players (12.5 percent).
- Seventy percent of anabolic steroid users sustained knee injuries, compared to 57 percent among non-users. The most common knee injuries were meniscus and ligament injuries to the knee.
- Anabolic steroid users also had a higher prevalence of ankle injuries (35 percent) as compared to non-users (25 percent). Ligament tears were the most common ankle injury among anabolic steroid users.

These findings suggest a link between the use of anabolic steroids and ligament or meniscus injuries. Tendon injuries were not higher in steroid users as previously suspected. The higher rates of meniscus and ligament injuries may be related to an inability to tolerate accelerated increased force generation and increased body mass. For example, short-term use of anabolic steroids can increase body mass by 3 to 5 kilograms and markedly increase the one-repetition maximum load that athletes can bench press.

Anabolic steroids may have been most attractive to the offensive and defensive line players because they need more mass and strength than players in other positions.

CONCLUSION

The authors found an association between anabolic steroid use and the development of ligament and meniscus injuries among professional football players. ▀

— Article by Brian Noehren

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