

Original Paper

## A Historical Timeline of Doping in the Olympics (Part 1 1896-1968)

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### Abstract

This article surveys the history of Olympic doping up to 1969. In 1968 the International Olympic Committee (IOC) conducted the first official drug tests on athletes competing in the Olympic Games. Up until that time Olympic athletes faced only a moral choice over whether or not to use performance enhancing drugs; the athlete was under no obligation to show that he/she was competing drug free. The timeline not only documents major doping violations by athletes but also explains and analyzes them in connection with scientific/pharmacological advances. It also looks at how national and international Olympic organizations have dealt with doping over time. The timeline makes clear that athletes have been more than willing to experiment with any drug that they believe will enhance their performance. It also shows how scientists and national Olympic organizations have sometimes helped athletes to cheat or turned a blind eye to the cheating in order to win more Olympic glory for their countries.

### Introduction

Doping, or the use of drugs, has been used by Olympic athletes to enhance performance for over 100 years. Some athletes have always been willing to risk the use of a drug if they thought it would help them win an event. Athletes have knowingly taken drugs that are dangerous. Coaches and national sporting federations have supported or turned a blind eye to this drug use. And the International Olympic Committee (IOC) only began testing for drugs in 1968 and has subsequently been criticized for not being aggressive enough.

Scientists have played catch up with the athletes when it comes to understanding the efficacy of these drugs and their safety. Scientists have also been slow developing tests to detect drug use by athletes. In fact, athletes, not scientists, have been on the cutting edge of drug experimentation for performance enhancement. Athletes' willingness to risk their lives for victory has led them to use drugs that were not made for sport or performance enhancement purposes.

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This paper explains and discusses decade by decade the use of performance enhancing drugs by Olympic athletes. It also chronicles how coaches sometimes help athletes to take drugs and how national sports federations and the IOC have been slow to take on drug use. This paper also looks into the science of drug use. Athletes have always been on the lookout for anything that will help them win. Whenever science has come up with a drug an athlete thinks might help them improve, they have taken it; no matter the danger or the actual intended use of the drug.

The first installment of this paper chronicles drug use up to 1969. 1969 was chosen as the first cut off point because that is the year after the IOC initiated drug tests for athletes at the Olympic Games. Up until this time the IOC had not taken drug use or doping by its Olympic athletes seriously. So this initial history of doping at the Olympics chronicles how the IOC finally came to conduct drug testing at the 1968 Olympics for the first time, and the immediate aftermath of that testing into 1969.

### The Early Decades

Drug use for performance enhancement has been a part of Olympic sport for over 100 years. Early cases of documented drug use were admitted to without consequences by athletes and coaches.

The first documented doping case occurred at the 1904 Summer Olympics in St. Louis. British born American marathoner Tom Hicks was given small bits of strychnine with brandy and a little egg-white by his coach Charles Lucas. In fact, Lucas admitted that he doped Hicks at the 22 mile mark of the race in order to stimulate him and help him finish [1]. After the race was over Hicks collapsed and had to be revived by four physicians. In the aftermath, Hicks' medal was not taken away and he showed no remorse over his doping. Winning, and the recognition that came with it, overrode any negative thoughts that he had only won because he had cheated.

At the 1920 Summer Olympics at Antwerp, Belgium, another American, Charlie Paddock, drank sherry with raw eggs before his 100 meter sprint final. He won the race and got to keep his medal [2].

At the 1936 Summer Olympics at Berlin, Germany, the 1932 Olympic 100 meter backstroke gold medalist, American swimmer Eleanor Holm, was disqualified for acute alcoholism [3].

Also in the 1930s, amphetamines are produced and soon become more popular among athletes than strychnine. This development, the manufacture of synthetic drugs and their use by athletes, is a critical harbinger for the future of Olympic competition and fair play. From now on, whenever athletes and their coaches discover a drug *they* think will improve their or their athlete's performance, regardless of its intended pharmacological use, some athletes will take it, and some coaches will introduce or recommend it.

In the field of scientific research, the isolation of testosterone in 1927 is an important milestone. Fred Koch, an organic chemist at the University of Chicago, comes up with the idea of extracting testosterone by pulverizing tons of bull testicles and treating the testosterone with benzene and acetone to obtain its essence. Koch conducts animal experiments (no human ones) and shows that the drug can demonstrate masculine characteristics in capons (castrated chicken) and aggressive behavior in hens and female calves.

However, the cost and the difficult method used to extract the testosterone precludes any serious interest in it at this time [4].

By 1935, however, synthetic testosterone is invented. Leopold Ruzicka, a chemist from the former Yugoslavia, was able to alter the molecular structure of cholesterol, producing synthetic testosterone. Experiments were carried out on humans. Scientists were able to report that synthetic testosterone changed the bodies of younger men. Chest and shoulder muscles were shown to grow much heavier and stronger. What scientists didn't understand at the time was why this synthetic form of testosterone was able to synthesize protein and thus speed the process by which protein becomes muscle [5].

At the 1928 Winter Olympics in St. Moritz, Switzerland a Medical-Scientific conference is held for the first time in conjunction with an Olympic games. The 1920s and 30s see physicians becoming concerned with the relationship of doping to sport. Modern sport is becoming part of the entertainment industry and it is acquiring a new kind of social significance for people. Also the increased presence of mass communication is making athletes into international stars [6].

In 1948, the IOC holds an important meeting at St. Moritz, site of the 1948 Winter Olympics. A delegate, Dr. Arthur Porritt, who will head the sub-committee on doping in the early 1960s, recommends that the IOC not involve itself too closely in questions of science and medicine and delegates this responsibility to the International Federation of Sports Medicine (FIMS). The IOC officially recognizes FIMS at its 1952 meeting at the Winter Olympics in Oslo Norway [7].

The IOC will keep itself officially separated from the science and medicine aspects of sport until the testing of athletes for performance enhancing drugs at the 1968 Summer Olympics in Mexico City. This willingness of the IOC to delegate such issues to an outside body is an early indicator of how the IOC does not see the importance of scientific and medical questions to sport itself and to the more important question of fairness in sport and how drugs could play a central role in that.

## 1950's

The 1950's see many instances of the existence of drug use in Olympic sport. In 1952, at the Winter Olympics in Oslo, Norway, several speed skaters become ill and need medical attention. According to the newspaper the *Christian Science Monitor*, spent syringes and broken ampules are found in the locker room [8]. This is one of the first reported cases of the use of amphetamines in competition.

Also in 1952, at the Summer Olympics in Helsinki, Finland, the first use of synthetic testosterone in athletics is believed to have occurred. The Soviet Union, competing for the first time at the Olympics, dominates the weightlifting event. The U.S. Olympic weightlifting coach, Bob Hoffman, tells the Associated Press (AP) of his suspicions of the Soviets: "I know they're taking that hormone stuff to increase their strength [9]."

Then, in 1954 at the World Weightlifting Championships in Vienna, Austria a Soviet doctor confirms U.S. suspicions about synthetic testosterone use. He tells the U.S. team physician, Dr. John B. Ziegler, that the Soviets are indeed experimenting with testosterone. Ziegler returns to the U.S. and experiments

with testosterone on himself, Hoffman and some other weightlifters. While the anabolic (muscle building) effects are visible so too are the androgenic (masculinizing) side effects like heightened aggression, hirsutism, deepened voice and an increased libido. Additional side effects like prostatic problems also exist so Ziegler, working with CIBA, a Swedish pharmaceutical company, refines testosterone to reduce the side effects the Soviets are experiencing.

CIBA biochemists significantly reduce the androgenic side effects by manipulating the molecular structure of testosterone, creating a synthetic derivative of testosterone, to increase certain of its properties and decrease others. This is the first anabolic steroid, methandrostenolone. CIBA gives it the trade name Dianabol.

Ziegler gives Dianabol to some weightlifters who see enormous improvement in their results. Within two years of the creation of Dianabol, almost every world-class athlete knows of its performance enhancing possibilities [10].

What is so important about anabolic steroids is that the athletes think they work. There is as yet no scientific proof that steroids improve muscle strength. Nonetheless, some athletes and their coaches believe anabolic steroids enable the body to maintain an improved nitrogen balance, which aids in protein synthesis—the key to tissue and muscle growth. Athletes who use them believe that the combination of new tissue with rigorous training exercises enables them to perform better.

At the 1956 Summer Olympics in Melbourne, Australia, however, the longer institutional use of synthetic testosterone by the Soviet sports system allows for weightlifter Arkady Vorobyov to destroy the Americans. He lifts twice his own body weight, more than anyone thought possible [11].

Dr. Ziegler intensifies his experiments with these anabolic steroids. Three U.S. weightlifters under his supervision, Tony Garcy, Bill March and Lou Riecke, all become national champions. March and Riecke set world records [12]. Ziegler, however, turns away from anabolic steroids when he discovers that the lifters he gave a placebo to report the same results as those lifters who used Dianabol. Ziegler believes that Dianabol only works as a psychological factor. He gives up his anabolic steroid experiments altogether when he discovers that some athletes are taking 20 times the recommended doses [13].

This kind of unsupervised and rampant use of drugs becomes the norm as the years go on. Authorities are unwilling to punitively sanction drug use in sport and at this time don't believe that some of the drugs are all that bad. Take the case of the American Medical Association (AMA). In 1957 it adopted an anti-doping resolution. The AMA had heard testimony on the widespread use of amphetamines in sport. But what is the effect of a resolution? At most it gives an athlete pause to consider the moral consequences of what he is doing. But the athlete is under no threat of sanction so those who want to use amphetamines and stimulant drugs can now see that those in authority will not punish them.

Besides, some physicians disagreed with the AMA's position. They see drug use as not performance enhancing and see other drugs, like anabolic steroids, as medically safe. So without a consensus from the medical community on the dangers of drug use in sport, the 1960's will see an explosion of drug use, especially in the Olympic sports of weightlifting and the strength events in track and field [14].

## 1960's

In 1960, the Council of Europe (21 West European countries) proposed a resolution against the use of doping substances in sport [15]. In February of the same year, at an IOC session, amphetamines are formally introduced and its members are encouraged to speak out about the drugs in their respective countries [16]. Also in 1960, the American sports physician Albert Hyman, in a letter to the *New York Times*, writes about his perception of the amateur athlete with that of the professional athlete. An amateur athlete who uses performance enhancing drugs is called a “perversion” and a “malignancy”. The professional athlete on the other hand is making a living, so he cannot be faulted for improving himself by any means necessary. The risk is part of being a professional [17].

Today we forget that at one time Olympic athletes were considered to be “amateur”. It is instructive to look at Hyman’s comments in their context. If he were speaking today he could not make such a distinction between professional and amateur. In fact, an Olympic athlete reading Hyman’s comments today would consider himself a professional and be relieved to hear comments like those made by Hyman.

Not until 1962 does IOC President Avery Brundage decide to officially investigate doping. The IOC sets up its first Medical Committee, the sub-committee on doping [18]. Brundage instructs the committee, headed by Dr.Porrirt, to examine doping and make recommendations on what to do about it. No recommendations come from the committee until the Tokyo meeting in 1964, however.

Meanwhile the reports on drug use keep coming in. At the 1960 Rome Summer Olympics Danish cyclist Knut Jensen dies during the Olympic road race. He had taken Ronicol, a blood circulation stimulant or amphetamine. Jensen is the first Olympic athlete to die since 1912 [19]. At the 1961 U.S. Women’s Olympic Swimming and Diving Trials in Detroit, Michigan, accusations are made that three of the swim teams are using amphetamines. Two of the alleged teams, Santa Clara and Multnomah (Portland) win every event and break every American record [20]. In 1961, in a report in the IOC *Bulletin* Marie Therese Eyquem alleges that female athletes are taking male hormones [21]. And many American track and field strength athletes start using Dianabol in the early 1960’s: 1968 Olympic shot-put champion Randy Matson, 1964 Olympic shot-put champion Dallas Long, 1956 Olympic hammer-throw champion Hal Connolly, decathlete Bill Toomey and 1968 Olympic decathlon champion Russ Hodge [22].

Political and sports authorities, however, are still only *discussing* doping, making resolutions and legislation, but not testing athletes. In January 1963, the European Council on Doping and an IOC subcommittee, the Biological Preparation of the Athlete Taking Part in Competitive Sports, come together to talk about doping in sport. The group adopts a motion from the council that asks the IOC to establish an international commission on doping. The commission’s mandate would be to educate officials and athletes about the dangers of doping, study athlete behavior affected by doping, and create a permanent board that would keep track of doping methods and list proscribed drugs and activities. The council also recommends drug testing [23]. France follows this by passing national anti-doping legislation in 1963, followed by Belgium in 1965. Officials are now becoming more active. With the recommendation by the commission to test for drugs a new phase in official awareness of the problem of doping in sport begins.

At the 63<sup>rd</sup> Congress of the IOC in Tokyo in 1964, Dr.Porrirt proposes a doping policy to the IOC. The IOC formally agrees to condemn the use of drugs, sanction those who use or promote drugs and ask

national sporting organizations to tell their athletes they are subject to examination and testing.

At the same time, also in Tokyo, the International Congress of the Sciences of Sport (organized by FIMS) goes even further than the IOC in this initial fight against doping in sport. Resolutions made by its Special Committee are tabled and then acted upon. The resolutions are presented to the International Cycling Union (UCI) and they agree to an amphetamine doping control for its Olympic team race on October 14. Three doping controls are carried out. The first control occurs when team numbers are chosen for the race. Riders' bodies are checked for traces of the injection of drugs. The second control is carried out at the starting line for the race. Riders are searched for suspicious objects and if found are confiscated. The third control involves the taking of urine samples from selected riders. No traces were found of any amphetamines in the samples [24].

The doping control of the team race at Tokyo is an extraordinary event. Physicians and scientists from a large organization have not only formally come out against doping in sport but they have also tried to implement measures with consequences for athletes. What would have happened if one of the cyclists had tested positive for an amphetamine? The IOC was left behind once again in talks, plans and proposed programs. We even have the extraordinary event of a drug control being carried out at the Olympics without official IOC sanction.

Some sports teams are also beginning to take doping seriously, too. In September 1964, prior to the Tokyo Olympics, the Danish cyclist Mogens Frey is dismissed from his team due to a doping scandal [25].

Some countries are also taking doping seriously, but for other reasons. In 1965, VEB Jenapharm, a German pharmaceutical company, synthesizes the anabolic steroid Oral-Turinabol. This steroid is the one that will be used in the East German sports doping program [26].

Meanwhile, also in 1965, at a full meeting of the IOC, delegates are unable to reach a decision about doping sanctions. The crux of the disagreement is over whether to penalize the individual athlete or the whole team.

This slow pace continues into the following year. At its 1966 meeting in Rome Dr. Porritt asks for support from the IOC for his subcommittee's doping recommendations. Among the recommendations are ones calling for all international sports organizations to adopt rules banning drug use, for the IOC to officially condemn doping and that it be allowed to officially sanction both individuals and organizations believed to be doping or involved in doping. It also asks for the testing of athletes at the Olympic Games [27]. But before these proposals can be implemented Dr. Porritt resigns from the subcommittee on doping and the IOC creates an entirely new committee, delaying the process.

One sports organization, however, the International Association of Athletics Federations (IAAF), does announce that it will spot check athletes randomly for doping at future Olympic and European track and field championships [28].

Finally, on May 9, 1967, in Tehran, Iran, the IOC adopts a drug testing policy. A list of banned substances is decided upon and drug testing using random urine screening is to be implemented in time for the 1968 Olympic Games [29]. That same year in August, the IOC Medical Commission is created. The

chairman is Prince Alexandre de Merode, a Belgian and a former member of the sub-committee on doping under Dr. Porritt. The commission decides to test for stimulants, narcotics, sympathomimetic amines, anti-depressants and tranquilizers using gas chromatography. However, no test for anabolic steroids is planned [30]. The tests will be carried out at both the Grenoble and Mexico City Olympic Games.

Later in 1967 the IOC defined doping as follows: “The use of substances or techniques in any form or quality alien or unnatural to the body with an exclusive aim to obtaining an artificial or unfair increase of performance in competition.” If one looks at this definition the IOC is against doping for two reasons: doping in competition is unfair to the nonuser and doping poses potential health risks to athletes [31].

These health risks to athletes were made clear for all to see at the 1967 Tour de France. The British cyclist Tommy Simpson, who was leading the overall race at the time, collapsed and died on television while ascending Mont Ventoux, one of the most important climbs in the tour. An autopsy revealed his body was filled with various kinds of amphetamines. And in 1968 the cyclist Yves Mottin died from complications of amphetamine use [32].

In 1968, at the IOC Congress held from October 7-11, IOC President Avery Brundage expands on the IOC position toward drug testing. The international sports federations themselves, and not the IOC, will carry out drug testing on their own athletes. Brundage asks that all federations agree to the drug testing measures in writing [33]. This lack of a supra-agency to coordinate and carry out drug testing will lead to a hodgepodge of results. Some federations will take drug testing seriously and some will not. In the run up to the Olympics, however, the IAAF managed to stay ahead of the IOC by drug testing its athletes in 1967 at “International Sports Week” in Mexico City.

At the 1968 Summer Olympics held in Mexico City drug use rumors abound. There is talk of a West German super steroid, that African runners are chewing kat, an herb from the Red Sea coast, to combat fatigue and increase endurance, that the Soviets have developed an anti-tension drug and a pro-concentration pill, that East Germans take caffeine concentrate to boost energy and that a special amphetamine, which has been made illegal for these Olympics, from West Germany cannot be detected by the drug test [34].

At Mexico City, the Olympic Medical Committee will select a sport at random each morning of competition. 10 athletes will be chosen at random and in the case of a team sport at least two athletes from each team will be chosen. Urine tests will be taken before the competition and if the test comes back positive the athlete will not be allowed to compete. One athlete, however, isn't worried about being caught by a drug test. Female shot-putter Margitta Gummel is put on the steroid Oral-Turinabol by the East German team physician Dr. Manfred Hoppner. There is no steroid test at these games. Gummel wins a gold medal and sets a world record [35].

One athlete caught by urine drug testing at Mexico City is a modern pentathlete. He tests positive for beer. Beer, it is claimed, calms the nerves and is thus a performance enhancer, giving the athlete a possible advantage. The IOC must think this is a serious problem because in 1969, at its meeting from June 6-10 in Warsaw, Poland, the IOC Medical Commission explains that it has adopted a blood test to detect alcohol in athletes competing in the modern pentathlon [36].

Steroids are nowhere to be found on the agendas of the IOC or the international sports federations,

however. But the athletes are sure aware of them. In 1969, in an article for the West German publication *Die Zeit*, the West German discus thrower Brigitte Berendonk says that the use of anabolic steroids is common among decathletes, discus throwers, shot-putters, weightlifters and half of the runners and jumpers. And the four-time U.S. Olympic discus champion Al Oerter says that the use of anabolic steroids is now so widespread that a young athlete must use them to stay on top [37].

Scientists and physicians are also getting more and more involved with steroids and its performance enhancing effects for athletes. H. Kay Dooley, a physician and member of the medical staff at the 1968 U.S. Olympic high-altitude training camp at South Lake Tahoe, supports the medically supervised use of steroids. In 1965 he supervised a study that administered three kinds of steroids to high school football players in California [38]. Another doctor, Pat O'Shea, conducts experiments in 1969 with Dianabol. The results show significant weight and strength gains over matched controls. O'Shea's experiments are important because they also incorporate a high protein diet and an intensive exercise program. O'Shea then conducts a double-blind repeat of his experiment and comes up with the same results [39]. In other words he's not just giving steroids to athletes. These steroid only experiments won't show the same results as O'Shea's do. This is the reason many other physicians say steroids don't work as performance enhancers. But they fail to incorporate the steroids into the overall training program of a highly trained athlete in their experiments. This flaw in their research will continue into the next decades.

## Conclusion

Decade by decade, from 1896 to 1968, performance enhancing drugs have been used by athletes who think it will make them champions. Clearly, when the Olympic movement was in its infancy, doping wasn't seen as cheating. Athletes who used performance enhancing drugs and their coaches openly admitted to it without any fear of sanction or suspension. The IOC and national sports federations said absolutely nothing about the danger or unfairness of performance enhancing drugs.

A major shift in this thinking occurred with the development by scientists of synthetic drugs, especially amphetamines and steroids. As first the Soviet Union, and then the United States, used these synthetic drugs to dominate Olympic competition, fair minded athletes, coaches, scientists and sporting officials came to view synthetic drugs as having an unfair advantage. It is this belief, that the use of synthetic drugs to gain a sporting advantage is wrong or unfair, that eventually put pressure on the IOC and its individual governing bodies to do something about doping. Medical officers within the IOC and various national sporting federations were the first to call for drug testing and their constant push for drug testing finally led to an Olympic wide drug testing program for the 1968 Olympic Games. Unfortunately, the one drug being abused more than any other, steroids, was not being tested for. Its advocacy by coaches and entire sporting programs like the one in East Germany, its abuse by athletes, and mounting evidence of its harmfulness to athletes, will force the IOC to take punitive action against steroids in order to keep up the ideal of the Olympics as a fair competition, where the best athlete, through rigorous training, becomes champion.



## References

1. Mallon, Bill. Interview with Amanda Smith. *The Sports Factor*. Radio National. Australian Broadcasting Corporation. 3 December 2004.
2. Eichner, Randy E. "Ergogenic Aids: What Athletes Are Using—and Why." *The Physician and Sports Medicine* 25; 1.
3. Prendergast, Heather, Todd Bannen, Timothy Erickson, Kierre Honore. "The Toxic Torch of the Modern Olympic Games." *Veterinary and Human Toxicology* 45, 2003. 100.
4. Todd, Terry. "Anabolic Steroids: The Gremlins of Sport." *Journal of Sport History*, 14, Spring, 1987. 92.
5. Almond, Elliott, Julie Cart and Randy Harvey. "Olympians Finding the Drug Test a Snap." *The Los Angeles Times* 29 January to 1 Feb. 1984, Part III 1+. A 4 Pt. series. 14.  
– Todd, op. cit. Anabolic, 92 & 93.
6. Hoberman, John. "Sports Physicians and the Doping Crisis in Elite Sport." *Clinical Journal of Sports Medicine* Vol. 12, No. 4. 2002. 204.
7. Wrynn, Alison. "The Human Factor: Science, Medicine and the International Olympic Committee, 1900-70." *Sport in Society* 7, (Summer 2004). 213 & 217.
8. Cart, Julie. "Sarajevo's Lab: Is It Up to Test?" *The Los Angeles Times* 10 February 1984. Part III. 15.
9. Almond, op. cit. Olympians, 14.
10. Todd, Terry. "The Steroid Predicament." *Sports Illustrated* 1 August 1983. 64.  
– Almond, op. cit. Olympians, 14.
11. *ibid.*, 14.
12. Todd, Jan and Terry Todd. "Significant Events in the History of Drug Testing and the Olympic Movement: 1960-1999." *Doping in Elite Sport* Eds. Wayne Wilson and Edward Derse. Champaign II: Human Kinetics, 2001. 66.
13. Wade, Nicholas. "Anabolic Steroids: Doctors Denounce Them, but Athletes Aren't Listening." *Science* Vol. 176, 30 June, 1972. 1400.
14. Hoberman, op. cit. Sports, 205.
15. Mallon, op. cit., Interview.
16. Wrynn, op. cit. Human, 218.
17. Hoberman, op. cit. Sports, 207.
18. Wrynn, op. cit. Human, 217.
19. Dirix, Albert. "The doping problem at the Tokyo and Mexico City Olympic Games." *Journal of Sports Medicine and Physical Fitness* 6, 1966. 185.
20. Todd, op. cit. Significant, 67.
21. Wrynn, op. cit. Human, 217.
22. Gilbert, Bil. "Problems In A Turned On World." *Sports Illustrated* 23 June 1969: 70.
23. Todd, op. cit. Significant, 67.
24. Dirix, op. cit. Doping, 183-184.
25. Underwood, John. "The Tokyo Games." *Sports Illustrated* 5 October 1964: 36.
26. Ungerleider, Steven. *Faust's Gold*. New York, NY: Thomas Dunne Books, 2001. 186.
27. Todd, op. cit. Significant, 68.
28. *ibid.*, 68.
29. *ibid.*, 68.
30. Wrynn, op. cit. Human, 220–221.
31. Todd, op. cit. Anabolic, 90.

32. *ibid.*, 96.
33. Todd, *op. cit.* Significant, 68.
34. Gilbert, *op. cit.* Problems, 72.  
– Todd, *op. cit.* Significant, 69.
35. Ungerleider, *op. cit.* Faust's, 146.
36. Todd, *op. cit.* Significant, 70.
37. "Breakfast of Champions." *Newsweek* 29 December 1969. 37.
38. Hoberman, *op. cit.* Sports, 206.
39. Wade, *op. cit.* Anabolic, 1401.