

THE BIOLOGICAL PASSPORT PROGRAM

A BRIEF HISTORY OF THE USE OF PERFORMANCE ENHANCING DRUGS IN PROFESSIONAL SPORTS AND THE LATEST METHODOLOGY BY WHICH TO IDENTIFY CHEATERS

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The use of performance enhancing drugs, or PED's, by professional athletes, which I will henceforth at times refer to colloquially as "doping" is considered cheating and is banned by all of the major professional sports, including the National Football League, the National Basketball Association, Major League Baseball, the United States Olympic Committee, and the Federation International of Football Association, otherwise known as FIFA which is the governing body over professional soccer, in addition to others. Doping has been going on for a long time, maybe longer than you realized, and it has received a lot of attention in the last 25 or so years when high profile athletes have been sanctioned, arrested, or otherwise punished for using banned substances to gain advantage over their rivals. A number of methods of determining if an athlete has been doing this have been developed over the years with varying degrees of success. Sometimes, when athletes have learned about the testing procedures, it has allowed them to fool the authorities by using various means of deceiving the testers for drugs. What you may not know is that a system has been developed to root out dopers with a high degree of success, and that system is being used successfully in some sports. However, that system is not being used by the big four American sports leagues, the National Football League, the National Basketball Association, Major League Baseball, or the National Hockey League.

Before I talk about that though, a brief history of performance enhancing drug use in professional sports.

My interest in the subject of doping came about as a result of the disgrace of my former hero, Lance Armstrong, who is said to have orchestrated the most sophisticated doping program in the history of sports. Surely everyone here has heard of this famous Texan who famously beat testicular Cancer which had spread to his lungs and brain from which he recovered and went on

to win the most grueling of all sporting events, The Tour de France, not one but seven times, earning tens, maybe over a hundred million dollars in the process, much of it through sponsorships and bonuses.

Lance started out as a swimmer, and due to genetic advantages, excelled. At age 12 he started doing triathlons which involve swimming, cycling, and running in succession, and he had a great deal of success there, being named Sprint Course Champion in 1989 and 1990 at the ages of 18 and 19, respectively. Following his diagnosis with Cancer in October, 1996, Lance was dropped from his professional cycling team, Motorola. After treatment he took a job with the United States Postal Service team in 1998 for way less money than he had been making, and achieved modest success in 1998. With the help of his US Postal team mates, he shocked the cycling world and won the 1999 Tour de France. What is known now, but wasn't known then, is that he and a few of his team mates were already using the drug erythropoietin, *otherwise known as EPO*, to enhance their cardiovascular capabilities which are very important in aerobic sports, such as running, cycling, swimming, etc. There was no test for EPO back then, but it was known to increase hematocrit levels in the blood which is a measure of the volume of red oxygen carrying blood cells, which are particularly helpful in the latter stages of multi-day races, such as the Tour de France, when the body's reserves are being depleted. In case you don't know, the Tour de France, which is essentially the Super Bowl of cycling, is a 21 day race covering over 1700 or so miles with six or seven of those days being in the Alps and Pyrenees Mountains in France. It requires super human endurance just to finish, much less to win against the best in the world. Incidentally, cycling has always been a European sport, so the French and others didn't care much for the brash Texan coming to their turf and dominating the way he did.

Anyway, since there were no tests for EPO in the late 90's and early 00's, the anti-doping forces set a rule that if one's hematocrit level was 50 or above, then it would be assumed that one was using EPO. Hence the trick became to keep one's hematocrit level in the upper 40's, ideally 49 or 49.5, and this worked for Lance, his teammates, and many others for several years. Oh ... by the way, he was also using testosterone, cortisone, and Human Growth Hormone which could be used in the off season when there was no testing. Additionally, Lance and several of his teammates engaged the non-drug cheating method of blood transfusing by removing blood from his system prior to the Tour, storing it in a refrigerator, and reinfusing the blood at two or three key points in the race.

But doping didn't just start with Lance Armstrong or his contemporaries. Long before the bicycle was invented, ancient Greek athletes experimented with herbal medicines, drank wine potions, used hallucinogens, and ate animal hearts and testicles in search of potency. Incidentally, the word dope is attributed to the Dutch word "doop," which is a viscous opium juice, the drug of choice of the ancient Greeks.

Roman gladiators used stimulants and hallucinogens to prevent fatigue and injury, while chariot racers fed their horses substances, such as hydromel, which is an alcoholic beverage made from honey, to make them run faster.

In the modern Olympic games, mixtures of strychnine, heroin, cocaine, and caffeine were used widely by athletes in the early 1900's, and each coach or team developed its own unique secret formula.

As a brief aside, anecdotal accounts from the early 1940's asserted that the Nazis tested anabolic steroids on prisoners, Gestapo members, and on Hitler himself. Testosterone was used by German soldiers to promote aggressiveness and physical strength. It has been said that in Hitler's later years, he exhibited characteristics that have been associated with heavy steroid use, such as mania, acute paranoid psychosis, overly aggressive and violent behavior, depression, and suicidal tendencies.

In the 1950's amphetamines, which were widely used by soldiers in the second world war, crossed over into sports, particularly cycling.

It is useful to note here that doping was not viewed negatively during the first one hundred or so years of professional sports, until about the 1960's. It was actually encouraged and considered natural, as most of the participants were working class individuals who used PED's in their personal lives to get through often grueling work duties. There was anti-doping sentiment which originated years before that, but that was in horse racing where some horses were doped to run slower and some were doped to run faster, so the first anti-doping law in America was made in 1897 by the Jockey Club in order to protect the gambling industry. (Incidentally, the phrase "inside dope" comes from having information about which horses were drugged, so as to increase one's betting success.) There was no such negative attitude toward humans using PED's at that time.

Now, cycling has a rich and colorful history of doping . . . not to mention other forms of cheating, such as riding street cars for part of the routes, sabotaging other riders, or hanging onto cars. There have even been riders who put a cork in their mouth attached to a transparent string, like a fishing line, which was attached at the other end to a car, in order to give the rider a slight assist. More recently so called "mechanical doping," which involves hiding a small electrical motor within the bike frame to give the rider a little assist has been an issue. Just for fun, let's look back at the substances some cyclists have used over the years, in order to gain advantage over other competitors.

Cycling is an old sport, although not as old as others, as the bicycle was invented in the early 1800's, and the Tour de France began in 1903. There have been allegations of doping, since that first year. For 60 years doping was not prohibited, and it wasn't until the 1960's that it was officially banned. Early riders consumed alcohol and also used ether, believe it or not, to dull the pain of the grueling event, in addition to chloroform. (How that helps, I have no idea.) Also used was nitroglycerine to improve breathing and strychnine to help with tight muscles. Some

riders suffered hallucinations and exhaustion. An American champion, Major Taylor, dropped out of a New York track race (which is an indoor race held on an oval track), saying, "I cannot go on with safety, for there is a man chasing me around the ring with a knife." Cocaine was also used to enhance performance by some riders, as were amphetamines. So were opiates.

Riders also suffered a number of other side effects caused by using these substances, including diarrhea, tremors, insomnia, and weight loss. At the 1956 Tour de France after stage 14, the entire Belgian team abandoned the race, due to what was called a "misery illness" likely brought on by morphine. During stage 12 of the 1955 tour, a French rider, Jean Mallejac, who had used amphetamines and alcohol, was "streaming with sweat, haggard, and comatose." He was said to have been no longer in the real world. He collapsed and fell to the ground with one foot still trapped in the pedal and the other leg pedaling in the air. It took medical treatment and an hour for him to regain consciousness.

In the 1960 tour Roger Riviere overshot a bend on a steep descent, fell into a ravine, and broke his back. It was later determined by doctors that he was addicted to opioid painkillers and that he had taken a heavy dosage prior to the race, causing his hands to be too slow to operate the brakes on the tricky downhill.

One author has stated that August 26, 1960, was the day that doping became bad. On that day, the Danish rider Knud Jensen became the first athlete to die in Olympic competition when he collapsed during a team time trial event at the Olympic Games in Rome and died later in the hospital. The autopsy revealed that he had taken an amphetamine and another drug, Ronicol, which dilates blood vessels. Following that Physician Pierre Dumas, who became a pioneer in the condemnation and regulation of PED's, led a committee of doctors demanding tests at the following games. Also during this time, people's views of drugs in general took a major hit as a result of the widespread use of the over-the-counter medication, Thalidomide, which as you know caused many terrible birth defects. Prior to that people generally had very positive views of pharmaceutical advances, such as antibiotics, and other so called wonder drugs. Concern was also growing about recreational drug use among many non-athletes.

France and Belgium made sports doping illegal in 1965, and the first doping tests at the Tour de France, which were done quite informally and unscientifically, took place in 1966.

British cyclist Tommy Simpson, who was named sports personality of the year by the BBC in 1965, died during the 13th stage of the Tour de France on July 13, 1967, after taking excess amounts of amphetamines and brandy to combat the effects of an illness. Allegedly, his motto was "if it takes 10 to kill you, then take nine and win."

In 1967 the International Olympic Committee established a medical commission to fight doping. The first drug testing at an Olympic games took place in February, 1968.

Three months later in Louisville, KY, Dancer's Image, a thoroughbred race horse, was disqualified from the Kentucky Derby for using a banned substance, phenylbutazone.

Interestingly, this drug is in the category of medication known as nonsteroidal anti-inflammatory medications, or NSAID's, which most of us have probably taken, and the drug was made legal for use in the Kentucky Derby by a judge's order in 1971.

The first disqualification of an Olympic athlete for doping was in October, 1968. The first *full scale* testing for doping in the Olympics took place in Munich, Germany, in 1972, and the substances involved were narcotic analgesics and three classes of stimulants. Seven athletes were disqualified. The first *steroid* testing at the Olympics took place in 1976 after a reliable test for the substance had been approved the previous year.

By this time the use of PED's had become widely viewed as a violation of the spirit of fair play and would eventually be viewed as morally repugnant.

Nevertheless, East Germany ran a highly systematic doping program for its Olympic athletes for decades involving some 10,000 individuals, some of whom were children.

As you likely remember, the Russians were sanctioned for systematic doping, prior to the recent summer Olympics this year when it was discovered by investigators that the country had been running a massive, state sponsored doping program for many years. The allegations first came to light in a 2014 German TV documentary in which whistleblowers claimed that 99% of Russian athletes used banned substances and that Russian officials both supplied the drugs and colluded with doping control officials to cover up failed tests. Russia, however, did not admit to wrongdoing, although an official did apologize for the failures of Russia's anti-doping system and blamed individual athletes. At one point banning the entire Russian team was considered, but instead, at the 11th hour, it was decided that 119 of the Russian athletes who qualified for the games be banned, including the entire weightlifting team and all but one of the track and field athletes; however some of them were reinstated.

During the 1990's, when other drugs became more detectable, cyclists began using the aforementioned EPO to enhance cardiovascular functioning by increasing red blood cells. It made a big difference in the latter stages of multi day races by improving performance by as much as 10-20%, depending on the individual.

In 1998 an employee of the Festina cycling team was arrested for possessing narcotics, EPO, growth hormones, testosterone, and amphetamines. Two weeks later police raided several teams' hotels and found a number of drugs. This crystallized the criminality of doping and mostly ended cycling teams, themselves, managing doping programs. In the next few years anti-doping measures were instated, and organizations were created to delineate and oversee testing for banned substances. However, this did not stop doping at all. It became the individual's choice to manage his own doping program, and as PED usage continued to be rampant, a few highly sought after doctors arose to manage the PED usage and other aspects of cyclist's training. The most well known of these was Michele Ferrari, who oversaw Lance Armstrong's, his team-mates, and others' doping activities.

Now as you know professional cycling is not the only sport where doping has taken place, and athletes in pretty much all sports have been sanctioned for doping. A Wikipedia search of doping cases in just Track and Field athletics yields hundreds of names, and if you search all sports, you get thousands, even one I kid you not..... In the sport of Curling.

Some of the most famous doping cases involved Ben Johnson, the temporary record holder for the hundred yard dash; Marion Jones, a multi medal track athlete in the 2000 Olympics; the boxer Shane Mosely, tennis star Andre Agassi, baseball players Roger Clemmons, Alex Rodriguez, Sammy Sosa, Mark McGuire, Jose Canseco, Ken Caminiti, and Barry Bonds; football players Lyle Alzado, and Bill Romanowski, among others, not to mention some college players. However, a list of suspensions by the NFL contains few for drug use, and most of those are for "recreational," as opposed to performance enhancing purposes. The large majority of NFL suspensions have been for various other behavioral problems, such as violating team and league rules, assaults, possession of firearms, and one notorious case involving the training of dogs to fight one another.

The United States Congress passed the Anabolic Steroids Control Act in 1990 which established penalties for athletic trainers or advisors who endeavor to persuade or induce individuals to possess or use anabolic steroids and classified anabolic steroids as a schedule III substance. Major league baseball banned the use of steroids in 1991. (17)

In the 1998 race between Mark McGwire and Sammy Sosa for most home runs in a season, which captivated baseball fans and captured the attention of many other non-fans when the story expanded to the mainstream media, both players broke the old record of 61 set by Roger Maris in 1961. It was later learned that both of them used PED's during that season. The record set by McGwire that season was subsequently broken by Barry Bonds who in 2001 hit 73 home runs, despite never having hit more than 50 in any prior season. Yep You guessed it He was also doping.

In May, 2002, Ken Caminiti, in a Sports Illustrated article titled "Coming Clean," admitted to using steroids during his 1996 National League MVP season with the San Diego Padres. He also asserted that half the players in the big leagues were using steroids.

As previously noted, steroids were banned by the MLB in 1991. However, due to opposition from the Players Association, testing for steroids has only taken place, since 2003, but there was no penalty then, and testing for human growth hormone and testosterone has only been done, since 2013. Actually, a testing program had been in place prior to these, but no one was ever suspended, because of it. Even now players are not tested that often. The National Football League began testing players for steroids in 1987. The league still does not test for Human Growth Hormone, and the players union has generally been resistant to stringent testing.

The BALCO scandal in 2003 revealed many users of steroids. BALCO, which was an acronym for Bay Area Laboratory Cooperative, originally supplied blood and urine analysis services and food

supplements to athletes, but in about the early 1990's they began to "market" a proprietary steroid compound developed by a chemist which was undetectable at the time. In 2003 the United States Attorney for the Northern District of California began investigating the company. Several major league baseball players, including Barry Bonds, NFL players, track and field athletes, a boxer, a judo athlete, and a cyclist were identified as customers and were subsequently embroiled in legal proceedings leading to varying sanctions.

In 2008, an investigative report by the San Diego Union-Tribune identified 185 NFL players as PED users, spanning every position and every franchise. Yet none of the players was suspended, and the league did little to follow up. Since HGH is not tested, no one in the NFL has ever tested positive for HGH, despite accusations against several players, including two time Super Bowl winner, Peyton Manning. (My father would be unhappy, if I didn't mention that, unlike most of the other names appearing in this paper, Peyton has never been confirmed as a PED user.)

In March, 2016, the well known tennis star Maria Sharapova admitted to using a banned substance which she claimed to have been using for many years and which had been banned the prior year. Although she was praised for her "grace" and "bluntness" in handling the situation when she held a news conference and announced her positive result, she was subsequently banned from competing for two years.

Two major entities who oversee testing for performance enhancing drugs are the World Anti-Doping Agency, or WADA, which was established in November, 1999, and the United States Anti-Doping Agency, or USADA, which was established in October, 2000. WADA was initially created and funded by the International Olympic Committee and is responsible for the World Anti-Doping Code, which essentially is a set of guidelines for testing, educating, and researching performance enhancing drugs and which has been adopted by over 600 sports organizations worldwide. USADA is in charge of drug testing for American athletes in the Olympics, Para-Olympics, and Pan-American sport. The NFL, the NBA, Major League Baseball, and the National Hockey League all conduct their drug testing "in-house."

OK . . . so how do we get performance enhancing drugs out of professional sports? Well, that's probably not going to happen, but I think that we will get closest to that goal by making the testing program so hard to beat that it deters athletes from doping, due to a high likelihood of getting caught.

Enter the Biological ... Passport ... Program.

According to the World Anti-Doping Agency, the fundamental principle of the Athlete Biological Passport is to monitor selected biological variables over time that indirectly reveal the effects of doping, rather than attempting to detect the doping substance or method itself. In other words, athletes are required to make themselves available year round for testing of *biological markers*, and their results are longitudinally compared to their own baseline results so as to identify changes in their individual biochemistry which would indicate doping. This gets around

the fact that people have individual differences in their own biological markers which makes assigning arbitrary values problematic at times. There is a hematological model which tests various blood markers and a steroidal model which tests urine, in order to detect steroid doping.

The Biological Passport assesses the percentage in the blood sample of immature red blood cells, called reticulocytes, and the volume of mature red blood cells. Also, a score is derived from the ratio of those two numbers. In healthy, anti-doping humans, none of those values changes very much, but in doped athletes they do.

WADA's Athlete Biological Passport Operating Guidelines were approved by WADA's executive committee and took effect on December 1st, 2009. The guidelines are continuously refined. The first sporting organization to implement the athlete biological passport program was the International Cycling Union (UCI) in 2008.

One of the things I'd like people to learn from this paper is that the sport of cycling appears to be doing, in my opinion, the best job of any sport in policing the doping issue. Cycling, which has no players union, accounted for a third of the 18,000 plus passport screens performed in 2012. Granted, this is due to the pervasive infiltration of drugs and other doping practices in the sport of cycling which has tarnished its image worldwide. No sport has a worse reputation with regard to doping than cycling, and that has a lot to do with the story of Lance Armstrong. Nearly two thirds of the top 10 finishers in the Tour de France between 1998 and 2013 used PED's. Ironically ... or maybe not so ironically, due to the damage caused by doping, professional cycling *appears* to have become one of the cleanest sports, due to stringent testing. Athletes must inform drug testing authorities of their whereabouts year round and are tested in and out of competition. One can be sanctioned not only for anomalous test results but for missing a test or for simply being somewhere other than where they said they would be. Testing is done with random timing, and it is also geared toward training schedules and competitions. The first three finishers in each day of a race, and others, are tested immediately after the race. Positive tests lead to immediate suspensions, usually for significant amounts of time, forfeiture of any wins, fines, and sometimes legal action. For example, in 2013 an Italian rider, Danilo DeLuca tested positive for EPO during the Giro D'Italia, which translated is the Tour of Italy, one of the three biggest grand tours in the world. He was immediately kicked out of the race and later banned for life and fined 35,000 euros. Not everyone is punished that severely, but when was the last time you heard of someone getting kicked out of the Super Bowl or the World Series or the NBA playoffs for doping?

Players unions in the major American sports exert power in negotiations with the leagues and are generally resistant to stringent drug testing. I believe PED's could be greatly reduced from these sports, if they adopted a Biological Passport program.

However, just as in the recreational drug world, users of PED's are constantly trying new ways to game the system, and some newer forms of doping are likely to emerge. One is "micro-dosing," which means taking small enough quantities of a drug so as to not alter the biological markers significantly. Another is so called "gene doping," which is defined by WADA as the nontherapeutic use of cells, genes, genetic elements, or of the modulation of gene expression, having the capacity to enhance athletic performance." In such cases nothing unusual would enter the bloodstream.

Will PED's ever be eliminated from professional sports? Probably not, although I think the situation has improved substantially in recent years. Do we want them to be eliminated? Or do we like seeing our athletes get as big, strong, fast and durable as they can, regardless of the methodology. Like corruption in politics, business, and government, we will likely be talking about this issue for years to come. I for one will continue to enjoy watching professional, and college sports, hopefully for years to come, regardless of the controversies, and I think it just adds an extra aspect to it all, in a way making it more interesting. The leagues have a vested interest in maximizing profits, and PED's tend to produce more excitement, which drives attendance at events higher. Another interesting question is how do we compare athletes of the past who did not have access to the same PED's as their more modern counterparts? Most sports fans have their opinions about who the greats of their chosen sport were or are, and there are myriad disagreements and differences of opinion in these areas. For example, comparing the great baseball players of the past with today's stars requires consideration of the differences in stadiums, equipment, training methods, and schedules. And then there is the issue of the Hall of Fame. Do you accept people into the Hall who probably wouldn't have been there without illegal drug use? And how do they compare to the Hall of Famers who came along before there were the sophisticated drugs and methods available in later years. Keep in mind that there are already a number of players in the Hall who used PED's, especially amphetamines. Remember, it was considered an indication of dedication for the first half of the century.

Nowadays, performance enhancing drug use is just another element to factor into these discussions.