

ANABOLIC ANDROGENIC STEROIDS FRIEND OR FOE?

Fame, glamour, and money are what many athletes have on their minds. They all have the competitive drive which separates them from ordinary people. They always want to be the best and in some cases will do anything to achieve their goals. The professional athlete portrays physical strength, athletic skill, and a muscular physique. Have they achieved these goals through years of strict diet, rigorous exercise and structured training regimens or by a shortcut known as anabolic steroids?

Description:

Anabolic androgenic steroids (AAS) are substances used to promote cell growth and division which results in the growth of several types of tissue, especially muscle and bone. These steroids have varying combinations of androgenic and anabolic properties. Anabolic steroids can offer potential gains in body mass and strength but can also harm multiple organ systems.

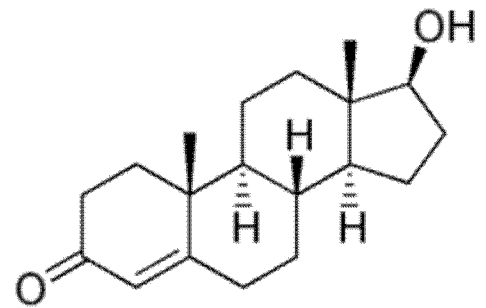


Figure 1. Picture of an anabolic steroid hormone

History of Drugs and Sports:

Improving athletic performance by the use of drugs is not a new practice. “As early as 776 B.C, the Greek Olympians were reported to use substances such as dried figs, mushrooms, and strychnine to perform better (Applegate).” Modern anabolic steroids are believed to have been discovered in the early 1930’s by German scientists. In the 1950’s Olympics, the American weightlifting team began using the anabolic steroid Dianabol to out lift their Russian competitors. In the decades that followed, steroid and stimulant use was prevalent among athletes. Formal drug testing by the International Olympic Committee began in the 1960’s with a ban placed on steroid use. However, these tests were not always conducted at random. Non-random testing allowed athletes to structure their cycles around the testing. Scientific trials continued through the late 1980’s with doubt that anabolic steroids had any real effect or harm on the human body. The early scientific trials were flawed due to lack of controls and dosage amounts. In 1990, the Anabolic Steroid Control Act placed these steroids into Schedule III of the Controlled Substances Act (CSA). “The CSA defines anabolic steroids as any drug or hormonal substance chemically and

pharmacologically related to testosterone that promotes muscle growth (National Institute on Drug Abuse).” According to CSA guidelines the illegal possession carried prison time and monetary fines. Many pharmaceutical companies stopped the manufacturing of these illegal steroids which caused the counterfeit drug market to emerge. Due to the technology of computers, counterfeit products were made by the use of the original label design. This technology allowed anything from vegetable oil to toxic substances to be bought by unsuspecting users who injected themselves and sometimes died from blood poisoning, methanol poisoning, and subcutaneous abscess. In 1996, scientific testing showed a clear connection in taking testosterone and the increase in muscle mass and decrease in fat mass. The use of steroids still continues with a win at all costs mentality by many athletes. The amended Anabolic Steroid Control Act of 2004 placed both anabolic steroids and prohormones on a list of controlled substances making possession without a prescription a federal crime (National Institute).

How Steroids Work:

In an interview with Jay Albright, M.D., Director of Sports Medicine at The Arnold Palmer Hospital for Children, Orlando, Florida, Dr. Albright described how, when inside the body, anabolic steroids bind to the normal androgen receptors. The steroids are then transported into the nucleus before they bind to the DNA inside the cell. In muscle cells steroids tell the cells to produce protein which is essential for muscle growth. Anabolic steroids also make the body develop pinfolds with more “branches.” To further explain this, pinfolds are structures inside muscle tissue that are shaped like half of a tree. They normally have one side of branches, however, when anabolic steroids enter the muscle cells, these pinfolds begin to develop two sides. Theoretically, the more pinfolds a person has, the stronger he or she is. Pinfolds make the muscles become stronger and are the measure of the strength of a person. According to Dr. Albright, steroids themselves are not bad; it is the duration and dosage that can cause harmful effects. Steroidal treatment has been used effectively to benefit various patient populations with certain diseases. Diseases which benefit from steroid use include Crohn’s disease, depression, and secondary wasting syndromes such as HIV. In an interview with Jose Perez, M.D, Neonatologist at The Winnie Palmer Hospital for Women and Babies, Orlando, Florida, Dr. Perez described how antenatal steroids, such as betamethasone, decreases neonatal mortality and respiratory distress syndrome in preterm infants. The

postnatal steroid, dexamethasone, has been administered to low birth weight infants to reduce the risk of chronic lung disease. Complications of dexamethasone currently being studied include gastro-intestinal perforation, poor growth, and an impact on brain development.

Steroids have three general effects that benefit an athlete. The first effect is the promotion of a positive nitrogen balance in the muscle which helps to produce a constant anabolic state. When in an anabolic state the muscles are growing more rapidly and becoming stronger. The opposite of this state is a catabolic state which is produced when the muscle is breaking down and recovering. Bodybuilders seek ways to keep their muscles in an anabolic state for longer periods of time without the use of anabolic steroids. The second effect is the saturation of androgen receptors. An androgen receptor is a part of the cell where testosterone binds

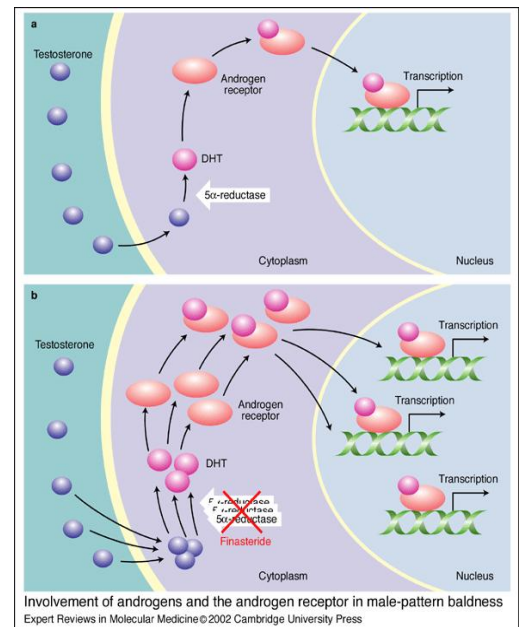


Figure 2. Androgen receptors binding with testosterone

and is allowed to be imported into the cell. The androgen receptor binds with the testosterone and escorts it through the cytoplasm, which is a jelly like substance that contains many parts of the cell. Through this process the androgen receptor and the testosterone go into the cell and become a part of the DNA. This step is called transcription, (see figure 2). When the androgen receptors are saturated with testosterone, it allows the muscles to become bigger and stronger. The third beneficial effect of anabolic steroids is the increase in muscle strength and aerobic capacity. With a heightened aerobic capacity, the muscles are allowed to work harder for a longer period of time which raises the fatigue point of the muscles. This benefit attributes to the reason why many athletes, such as cyclists and runners, have tried steroids. This allows the athlete to continue through an entire sporting event without fatigue (Wikipedia).

Negative Effects:

Anabolic steroids can have devastating effects on the human body. Some of these effects are gender oriented or occur only in males or only in females. For males negative effects can include growth of breast tissue, shrinking of testicles, and temporary infertility. For females negative effects includes increase

in body hair, deepening of voice and temporary decrease in menstrual cycles. Symptoms that can affect both sexes include premature baldness, acne and even depression. In many medical studies, steroids have been linked to causing aggressive behavior. This connection is especially noticeable in adolescents. In an experiment at Harvard Medical School in Boston and McLean Hospital in Belmont, Massachusetts, men were given a high dose of a form of testosterone. Subjects played a computer game against an invisible player who they thought was real. The object of the game was to either earn points for themselves, which turned into cash at the end of the study, or to detract points from their opponents. When given a low dose of the testosterone, players worked to earn points for themselves. When given a high dose of testosterone, players became more aggressive and worked on trying to detract points from their opponents. Doctors believe that the increased aggression is due to a hormone called arginine vasopressin which is naturally found in the human body. Steroids may increase the effect of this hormone in the body. One of the most devastating effects of steroid use is hardening of the left ventricle of the heart. The heart is a smooth muscle and works by pumping blood through the body. Steroid use can make the heart muscle become harder which in turn does not allow the heart to function properly. One example of this heart problem is former World Wrestling Entertainment (WWE) wrestler, Eddie Guerra. Guerra decided to take anabolic steroids so he could look better for the fans and perform at new levels in the wrestling ring. Although he performed at higher levels, he ended up dying from a heart attack due to the use of anabolic steroids.

Many people say they would never take steroids; however, research continues to suggest steroid use is becoming more common among males and females who just want to look good or get ahead. For many this may be true, but with exercise and a proper diet they are able to be successful athletes based on their own talent and skill. Clark Flynn of Bedford, Nova Scotia, former top Canadian weightlifter, says, "Making steroids part of your life is the same as cheating. The Olympics aren't just about going to the games," he says, "It's about the challenge, it's the philosophy, it's the way you live your life (Newman)." For others however, the drive for excellence is just too overwhelming. Competitors end up trying so hard to make it to the next level or become greater at the sport played, that they can not resist taking something to give them the edge over their fellow competitors.

Educational initiatives and changes in drug rules and testing continues to be a frontline weapon against steroid use. These initiatives hopefully will turn the tide and eliminate the prevalent use of anabolic steroids.

Resources

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