

Steroids in Combat sports: Adverse effects on health

Basic effects of increased testosterone

Testosterone is a hormone which has multiple effects in men and women. These effects can be divided into two basic groups: androgenic and anabolic. Androgenic effects include the development of the male reproductive system, i.e. sperm. Anabolic effects include growth of skeletal muscle. Testosterone works on these different systems by attaching to specific receptors, including muscle receptors. Some testosterone is converted by the body into estrogen. Estrogen is the primary female sex hormone. Athletes who use performance-enhancing drugs desire the anabolic effects while minimizing the androgenic effects.

Steroids and estrogen blockers

There are many products which are used to obtain anabolic effects. Some example products include testosterone, nandrolone, and stanozolol. Other products, such as DHEA and androstenedione, have been marketed as supplements. These products directly stimulate the androgen receptors throughout the body.

In addition to these steroids, anti-estrogens can be used to decrease the conversion of testosterone to estrogen which would increase the testosterone levels. Products include estrogen receptor blockers (i.e. clomiphene) and aromatase inhibitors (i.e. anastrozole).

Adverse health effects

Steroids have many harmful effects on an athlete's body. The body uses various hormones to control metabolic activities. In children and adolescents, steroids can lead to early stoppage of bone growth resulting in growth retardation which is irreversible. Steroids can increase the risk of tendon and muscle injury. They may cause osteonecrosis (bone death and destruction) in the hip and shoulder. Steroids decrease sugar (glucose) tolerance and thyroid function. Male-pattern baldness can start or accelerate with the use of steroids. Men develop gynecomastia, which is increased growth of breast tissue. This growth is irreversible and requires surgical excision. Conversely, women's breasts will shrink. Women will also develop hirsutism, or the growth of male-pattern hair at the face, armpits, and pubic areas. Vocal cord hypertrophy leads to deepening of the voice, a condition particularly harmful to females. These changes lead to masculinization in females which is often irreversible.

The heart and blood vessels are also affected by steroids. An athlete's cholesterol profile will deteriorate, via an increase in "bad" cholesterol (LDL) and a decrease in "good" cholesterol (HDL). An increase in red blood cell count will lead to polycythemia and "thickening of the blood." High blood pressure develops. The risk of forming blood clots,

or thromboses, also increases. The accumulation of these changes can lead to many problems including stroke, heart attack, and heart failure. Sudden cardiac death has also been reported.

Many changes in behavior have been studied. One effect is an increase in libido (desire for sex). While this may seem to be a beneficial result, it is often an uncontrollable desire which can lead to violent actions. Steroid users are prone to irritability and mood swings. They become more aggressive and demonstrate destructive impulses; this has been called "roid rage." These actions may result in harm to the user or to others. Psychosis, depression, and suicide have all been linked to steroid use.

Steroids are toxic to the liver, which can result in liver failure. Cholestasis results when bile, a substance made by the liver to help with digestion, cannot flow from the liver into the intestines. The collected bile leads to jaundice (yellowing of the skin and eyes.) Another result of steroid use is the development of blood-filled sacs within the liver. These sacs can potentially rupture leading to significant bleeding. Finally, there is an increased risk of developing certain types of liver cancer.

Steroid use has a tremendous effect on the male reproductive system. The binding of steroids to androgen receptors leads to gonadal (testicle) suppression by a negative feedback mechanism. Basically, the body thinks that there is enough testosterone available and stops making it. This loss of testosterone production leads to a reduction in sperm function and a decrease in testicle size. Men may experience impotence (erectile dysfunction) as well as priapism (prolonged erection.) Men also may develop prostate hypertrophy (enlarged prostate.)

Women also experience negative effects on their reproductive system. Ovary function is suppressed. The uterus can shrink. Menstrual cycles become irregular or stop altogether. Enlargement of the clitoris may occur. Furthermore, steroids may cause birth defects in the event a woman becomes pregnant.

Acne is another detrimental side effect. In addition to spreading acne across the body, an athlete can develop serious types of acne, such as acne conglobata. Acne conglobata is an unusually severe form of acne characterized by burrowing and interconnecting abscesses and irregular scars, often producing pronounced disfigurement. Many steroid users are first suspected because of these changes in their skin.

Finally, there are detrimental effects related the specific steroid compounds which are used and the manner in which they are administered. Illegal steroids are not regulated by the Food and Drug Administration. Toxic effects may occur as dosages on products are not regulated and may be inaccurate. Products may be tainted with substances not shown on the labels. Skin and soft tissue infections can occur from poor injection techniques. Shared needles can lead to Hepatitis B and C as well as to HIV infection.

Addiction potential

Historically, steroids have not been considered to be addictive, either by users or medical personnel. Recently, evidence has shown that there is an addictive potential. Addiction can be defined by the development of involuntary overdosing, tolerance, and withdrawal. A study in hamsters showed that they developed steroid tolerance, withdrawal symptoms similar to opioid overdose, and even fatal overdosing. Therefore, the use of steroids can not be entirely controlled and athletes must be aware of the development of addiction.

Conclusions

Performance enhancing steroids are illegal in the United States. Many organizations including the Nevada Athletic Commission have banned their use and administer severe penalties for those discovered using these illegal substances. Athletes caught using steroids suffer public humiliation, poor media exposure, and loss of potential income from sponsors and from suspension from competition. Perhaps, education is the most important means of deterring the use of steroids. Athletes, trainers, and promoters must understand the serious nature of the adverse health risks associated with steroid use. Hopefully, this knowledge will help to decrease the use of steroids in sports.

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