



Section 12

Ergogenic Aids

Ergogenic (performance enhancing) aids can include nutritional aids such as protein / amino acid supplements, vitamins / mineral supplements and carbohydrate loading, and pharmacological aids such as anabolic steroids, caffeine, human growth hormone, testosterone, androstenedione, creatine and dehydroepiandrosterone.

Anabolic Steroids

Androgenic anabolic steroids are drugs that have a function similar to that of androgenic hormones (commonly referred to as male hormones, such as testosterone). These hormones are responsible for secondary sex characteristics development (androgenic component) and growth acceleration by way of bone development and increased muscle mass (anabolic component). The androgenic properties of synthetic steroids are altered to decrease its masculinizing effect while the anabolic properties are increased for the desired muscular growth.

Steroid use is found among athletes who participate in sports requiring size, strength, speed and power are prime candidates for anabolic steroid use. Track and field athletes (shot putters, discus and hammer throwers, sprinters, decathletes), weight lifters, cyclists, boxers, swimmers, football, baseball and basketball players are some examples.

Steroid use is found in high school sports, college sports, and world class athletic events.

Non athletes use steroids for aesthetic reasons.

Research indicates steroids cause an increase in enzyme involvement and protein metabolism that stimulates protein synthesis. This elevation in protein synthesis enhances muscular growth. Exercise (resistance training), adequate protein consumption and anabolic steroids can all increase protein synthesis.

The Drug Enforcement Agency (DEA) has made anabolic steroids a Class III drug, which means a user can receive up to a year in prison and a \$1,000 fine. Sellers can receive 5 years in prison and a \$250,000 fine, and a second offense can bring as much as 10 years and a \$500,000 fine.

Steroid Side Effects

The body's normal production and secretion of gonadotropin is suppressed and may cause atrophy of the interstitial tissue in the testes.

Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) are suppressed, which decreases testosterone production by the testes.

Prostate enlargement.

HDL cholesterol levels are markedly depressed.

Liver damage (toxicity)

Stunted growth (children)



Acne

Increased blood pressure

Elevated aggressiveness

Bone enlargement

Male pattern baldness

Enlarged breasts

Increased sex drive

Human Growth Hormone (HGH)

Human growth hormone (HGH) contributes to the body's overall size gains throughout the developing years. Physicians have used HGH to treat children with abnormal growth in order to provide them with a normal growth pattern.

Researchers have attempted to use HGH (as an alternative to steroids) to facilitate increased size and strength in selected adult athletes. Physical changes will occur, but the research is not conclusive as to how effective and safe these changes may be.

Caffeine

Caffeine, a mild stimulant, has been linked with a possible carbohydrate sparing effect for endurance athletes (marathon runners, swimmers). Caffeine is a diuretic (used to control body water.)

Testosterone

Testosterone, the four-carbon ring from which every anabolic steroid is derived, is the most coveted muscle building hormone in existence.

Androstenedione ("Andro")

This "natural" hormone is produced in the body and converted in just one step to testosterone. "Andro", while not classified as a steroid, functions like one to boost testosterone levels so you train harder and recover more quickly. It is naturally found in meats and plants. "Andro" pills are more concentrated and may produce unwanted consequences such as acne, mood swings, male pattern baldness, abnormal prostate growth, increased sex drive, enlarged breasts, liver problems, create heart problems, and stunted adolescent growth. The NFL, NCAA, and USOC ban it. The Association of Professional Team Doctors recommends that it be banned from all sports.



DHEA (Dehydroepiandrosterone)

DHEA is a powerful steroid hormone produced by the adrenal gland. The FDA says it should not be sold without a prescription. Side effects include decreased testicle size, enlarged liver, and increased aggressiveness.

Creatine

Creatine is an amino acid found primarily in meat and fish but also available in tablet and powder forms. Research indicates that creatine helps you work harder, train longer, and build muscle faster by raising the energy level within muscles.

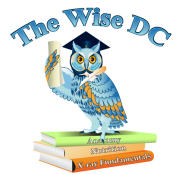
There is an upper limit to the creatine levels that can be achieved, so taking larger dosages does not help more; once the muscle becomes saturated, excess creatine is simply excreted by the kidneys. Vegetarians and occasional meat eaters achieve the most pronounced effect from supplementation, while meat eaters accumulate a negligible amount of additional creatine.

Creatine increases the capacity to train, and the increase in training eventually increases strength, size, and performance. Athletes taking creatine are more susceptible to muscle cramps, spasms, and pulls. Creatine can cause a 10 to 15 pound increase in body weight due to water retention in the muscles. This extra weight can negatively impact performance, reducing first-step quickness, acceleration, and speed. The long term effects of creatine use are yet unknown.

Glycogen Supercompensation

When an endurance athlete progresses through his event (such as a marathon), their body's glycogen (carbohydrate) content decreases as their distance increases. Since the body cannot continue to function optimally without some amount of carbohydrate available, the exercise intensity would ultimately drop. An example of glycogen depletion and total physical fatigue would be a marathon runner "hitting the wall" near the 20 mile section of a 26.2 mile run. Because of this occurrence, the athlete may attempt to saturate their muscles and liver with glycogen before an event so that they will have sufficient levels of carbohydrates available towards the end of their race. This "overload" technique is known as glycogen supercompensation, or carbohydrate loading. This process involves a combination of high carbohydrate consumption ("loading") and decreased physical activity ("tapering") several days prior to the race.

Glycogen supercompensation would not benefit a weight trainer. The weight trainer would never train continuously enough to completely deplete their glycogen stores. Glycogen supercompensation is a technique normally reserved for endurance athletes because glycogen depletion normally occurs after two or more hours of continuous, intense exercise. The weight trainer, should ingest a moderate amount of food several hours before their workout. This will help them to maintain a normal blood glucose level throughout their training period and will allow them to exercise without a full stomach.



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