

STEROIDS

Control of steroids under the Misuse of Drugs Act seems just a matter of time. Arm yourself with the facts before steroids become another part of the drug abuse business.

Harry Shapiro

ANABOLIC STEROIDS are a group of hormones which occur naturally in the body and are responsible for the development and functioning of the reproductive organs.

In the male, testosterone, made in the testes, is the anabolic steroid found in the greatest quantities. Production of testosterone is itself stimulated by another hormone, gonadotrophin, produced in the 'master' gland, the pituitary.

As well as controlling the growth, development and function of the male sex organs, testosterone and the other hormones are responsible for the 'masculinising' or 'virilising' effects of male puberty, including the deepening of the voice and the growth of body hair. These represent the 'androgenic' effects of male sex hormones.

These hormones also have an 'anabolic' or building up effect on the body. Steroids increase the retention of nitrogen, a basic constituent needed for the development and growth of muscle tissue.

The balance between androgenic and anabolic effects differs for each hormone. Most synthetic anabolic steroids are derived from testosterone, even though this hormone is actually more androgenic than anabolic. To avoid virilising side effects on women and children, the chemical design of synthetic steroids aims to enhance their body-building and diminish their masculinising properties. Even so, the drug companies have so far failed to produce an exclusively anabolic steroid and all those available have some androgenic side effects as well.

Is performance improved?

The main rationale for taking steroids to increase strength is that their anabolic action can increase muscle mass thereby improving strength. So in any event where strength, power or body mass are important (eg, field events in athletics), use of anabolic steroids during training would seem to be effective.

However, research studies over a number of years have shown that only in certain circumstances will steroids increase strength rather than just inflate muscle size. Increasing body mass of itself is useless in the search for athletic

success unless just being big is important — as it is, for example, for some of the playing positions in American football.

Research on the efficacy of steroids in increasing strength is a controversial area. Critics say studies which found no change in strength used inexperienced weightlifters as subjects, lacked any dietary control, were based only on low intensity training, and used non-specific strength tests.

Critics of studies which *did* show an increase in strength say these had too few subjects, used improper statistical designs, and had unsatisfactory reporting of results.¹

Even so, it is now generally accepted that taking anabolic steroids will increase muscle strength if:

— the athletes have been intensely trained in weightlifting;

— they continue intensive training during the steroid regime; and

— this regime is supplemented by a high protein and high calorie diet of particular quality.

Body-building for strength events is the most well known use of steroids, but they are also used to improve speed, endurance, and competitiveness.

Steroids help the formation of the blood cells which transport oxygen so, in theory, might help increase endurance. However there is no evidence that taking steroids actually does enhance performance in speed or endurance sports. In contrast to power events, sports such as running or swimming use up lots of energy in the form of calories, tending to reduce body weight. As a result the body-building action of anabolic steroids may be negated.

Athletes have reported that they feel less tired after taking steroids, enabling them to recover from strenuous workouts more quickly so they can train at a higher intensity for longer periods. This seems to be a major reason for the use of steroids other than by 'power' athletes, though the scientific evidence for this effect is lacking.

Because of their virilising effects, steroids are said to promote aggressiveness in athletes, making them train harder. This could pay dividends on the track or sports field, as hard training is itself anabolic.

Conversely, it has been proposed that a placebo effect is in operation — athletes only *think* they are more aggressive. However, if people feel more aggressive and act accordingly, it is academic whether there is a 'real' pharmacological effect at work.

One indication that the 'edge' steroids are said to give might not be all 'in the mind' comes from a double-blind study using steroids and non-drug placebo pills. In this study, neither the subjects nor the experimenters knew who had been given what. On the basis of their mood changes, the athletes who took part were 100 per cent accurate in identifying whether they had been given steroids.²

The health costs

◆ **Hormonal and reproductive systems.** While taking steroids there is a significant reduction among men in the production of testosterone by the testes. This is thought to happen because the brain reacts to the excess of male hormones in the blood by decreasing the production of gonadotrophin: less gonadotrophin means less testosterone. Sperm output and quality are also decreased and can take months to return to normal after use is stopped.

Male sex drive appears to increase at the beginning of a steroid-using cycle but can fall below normal after several weeks of use, and remain low after the drug is stopped until natural testosterone production recovers. Some athletes have reported no change in sex drive; some have felt their sex drive has never returned to normal after prolonged use.

Some men exhibit over-development of the mammary (breast) glands which may not entirely disappear after steroids are discontinued. Extra breast tissue has been removed surgically for cosmetic reasons, but scarring may be visible.

Women athletes taking steroids report increased sex drive and menstrual irregularities and there may be permanent enlargement of the clitoris.

Women who use steroids derived from male sex hormones run the risk of developing secondary male characteristics. Growth of facial and body hair, deepening of the voice, male-pattern baldness and decreased breast size all appear to be non-reversible side effects of steroid use by women which are not countered by the supplementary use of female hormones. There is a risk that these will be passed on to a female foetus if the athletes are pregnant when using steroids.

◆ **Liver and kidney function.** Liver function tests can show abnormalities during a steroid using period. The readings usually return to normal once the drug is stopped, as does drug-

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induced jaundice caused by temporarily impaired excretory function.

More serious but more rarely reported are: — peliosis hepatis, a rare form of hepatitis associated with TB in which liver tissue dies to be replaced by blood-filled cysts. In 1984 a world literature review cited 23 cases induced by steroids, none involving athletes.³ The condition remits if the drug is stopped, but occasional deaths have been recorded;

— liver tumours associated with steroids, reported in 36 of the studies cited in the literature review referred to above. One of the cases was an athlete with no previous history of liver problems who died of liver cancer after using steroids for four years as an aid to body building. In 1987 a bodybuilder with no previous history of liver problems died of liver cancer associated with steroid use;

— Wilm's tumour, a cancer of the kidney very rare in adults. There are only two reports of athletes dying of Wilm's tumour. Both had been using steroids, but there was no definitive evidence that these caused the cancer.

◆ **Heart and circulation.** Because of their water-retaining properties, steroids have the

potential to cause high blood pressure. Steroids cause nitrogen retention, and the more nitrogen is retained, the more water has to be retained to maintain the balance between the two. This can increase fluid in the body to abnormal levels which in turn increases blood pressure.

Steroids also reduce the level of the 'good' cholesterol (HDL cholesterol) which protects blood-vessel walls by removing 'bad' cholesterol and carrying it away to the liver. As a result it's possible that steroid use could have implications for coronary heart disease and atherosclerosis (hardening of the arteries), but there are no confirmed case reports of steroid-induced heart disease in athletes.

◆ **Growth.** Anabolic steroids stimulate growth of the long bones by causing new bone to be laid down at either end of the shaft. However, steroids have an even greater effect on the conversion of plates of cartilage into bone. Once this process is completed no further lengthening of the bone is possible. Because they cause early fusion of cartilage plates, steroids can stunt growth, in turn potentially distorting the body and causing spinal problems.

◆ **HIV/AIDS.** Athletes who share equipment

for injecting steroids risk contracting HIV.⁴

◆ **Mental health.** There are a few case reports of temporary psychiatric problems associated with anabolic steroids. These appear to remit when the drugs are stopped. They include confusion, sleep disorder, depression, hallucinations, paranoia and delusions of grandeur and reference (believing you are somebody else).⁵

◆ **Addiction.** Steroids are not physically addictive. Athletes do not continue to take them to avoid the discomfort of physical withdrawal symptoms.

However, an athlete who has performed well after using steroids may become convinced that the drugs are needed to maintain this success. Athletes have reported lethargy and depression after stopping steroids. This could be related to the disturbance to the hormone system caused by steroids, or just be caused by the athlete's belief that, without steroids, their performance will suffer. ■

In the next issue Harry Shapiro gives his personal assessment of the highly charged debate over drugs in sport

1. Goldman B. *Death in the locker room: steroids and sport*. London: Century, 1984, p.203.
2. Freed D. et al. "Anabolic steroids in athletics." *British Medical Journal*: 1972, 3, p.761.
3. Haupt H.A. and Rovere G.D. "Anabolic steroids: a review of the literature." *American Journal of Sports Medicine*: 1984, 12(6), p.469-484.
4. Sklarek H.M. et al. "AIDS in a bodybuilder using anabolic steroids." *New England Journal of Medicine*: 1984, 311(26), p.1701.
5. Pope H.G. and Katz D.L. "Affective and psychotic symptoms associated with anabolic steroids use." *American Journal of Psychiatry*: 1988, 145(4), p.487-490.
6. Strauss R.H. ed. *Drugs and performance in sports*. Philadelphia: Saunders, 1987, p.59.

How do steroids increase strength?

- ◆ There is an increase in protein synthesis as a direct action of steroids.
- ◆ The stress of intensive weight-training causes the release of corticosteroids which help break down muscle protein. Anabolic steroids block this breaking down or 'catabolic' (opposite of anabolic) effect.

Are high doses needed?

Clinical trials testing the effects of anabolic steroids on performance have mainly involved low/therapeutic doses of the drugs (10-20mg a day). Athletes have claimed that far higher doses are needed to improve performance.

Against this is the fact that steroids 'hook' on to special receptors in body cells; once these are saturated, higher concentrations of steroids probably have no further effects.⁶ But no one knows what the saturation levels are, how long very high doses of steroid stay in the body, how long they take to build up, etc.

The problem of assessing health risk

For several reasons evidence on the health implications of steroid use by athletes is limited. Clinical studies on health and steroid use primarily involve patients prescribed steroids in therapeutic doses for various medical conditions. There is only very limited data on the long-term effects of prolonged, high dose steroid use among athletes. Information in this area is largely subjective or anecdotal and complicated by the fact that athletes usually have no idea what doses they are taking.

Athletes also take steroids in arbitrary cycles interspersed with 'rest periods' and often use different steroids together, known as 'stacking'. Some even take steroids meant for animals. Human clinical trials with these drugs would be even more unethical than with those meant for human consumption.

However, where a potential or actual problem with steroids has been identified at therapeutic doses, it is probably reasonable to extrapolate that the risks would be greater if the drugs were taken at higher doses and without these being regulated by a medical practitioner.



Even in *Natural*, a US bodybuilding magazine with an anti-drugs theme (see left), the ads acknowledge the power of steroids.

THE STACK

STERIODS work so well because they do two things to the human body. They cause an anabolic effect and increased testosterone level. NOW by taking DIBENCOSIDE you cause an anabolic effect and by taking YO-HIMBE BARK EXTRACT you increase testosterone level.

