

# News & Comment

## The Drug of Champions

*Athletes and body builders support a \$100-million black market in steroids, while medical science has been slow to see why*

THE "PARTY LINE" on anabolic steroids has been that they do not boost athletic performance, says a federal official. "I know, because I've written it many times in letters." But the party line is ignored. The body-building power of steroids, which scientists could not verify and did not want to advertise, has been broadcast by the athletes themselves, most spectacularly by Ben Johnson, the Canadian track star.

Johnson won a gold medal at the Olympic games in Seoul this September for running the 100-meter race in a record-breaking 9.79 seconds. He shot past his competitors like an explosion and took the victory with ease. But 72 hours later, Olympic officials announced that the performance was drug-fueled. There were traces of stanozolol, a prohibited anabolic steroid, in a urine sample taken from Johnson after the race. Johnson was stripped of his medal.

Anabolic steroids are a synthetic variant of testosterone, the hormone that makes men male. The German government under Hitler developed and used them, allegedly in an attempt to create an army of supermen. The original goal in making these drugs was to promote the anabolic (tissue-building) effects of testosterone without its androgenic (masculinizing) qualities. Although the an-

drogenic effects were reduced, they were not eliminated, and this remains one of the main problems with anabolic steroids today.

The androgenic risk is particularly acute for women, in whom it may be impossible to reverse masculine traits once they appear—including facial hair, a deep voice, and a male physique. Androgenic drugs also hasten adulthood, causing early baldness in some adolescents and limiting their stature. In men, overuse can suppress natural hormone production, causing the testes to shrink and breasts to grow. Overuse of these drugs also carries a substantial risk of kidney and liver damage, liver cancer, and heart disease.

After the war, anabolic steroids were used in legitimate medicine to treat female breast cancer (by reducing estrogen), to combat two kinds of anemia, and to reduce the effects of hereditary angioedema. According to Gloria Troendle of the Food and Drug Administration (FDA), there are now better drugs for the first ailments and an alternative for the angioedema. The steroid found in Johnson's urine, stanozolol, is prescribed in the United States only for treatment of angioedema, and is available from Winthrop Pharmaceuticals, a subsidiary of Sterling Drug, in tablet form ("Winstrol"). In Cana-

da, it is also available as an injectable.

As the medical need for anabolic steroids declined, their popularity among athletes soared. Soviet weight lifters began using them as a power booster in Olympic competitions in the 1950s, followed by the Americans in the 1960s (*Science*, 30 June 1972, p. 1339). At first they were regarded as a rarefied tool of the super-athlete, a means of adding an edge to a performance already near perfection. Gradually the word spread that anabolic steroids were good for any sport that required strength. They were taken up by football players, shot-putters, discus throwers, and even by swimmers and sprinters.

A huge black market has developed, which FDA enforcement official Don Leggett thinks may involve \$100 million in sales annually. Leggett says the underground deals involve diverted prescription drugs, veterinary products (such as the racehorse steroid "Equipose" or boldenone), and an extensive menu of foreign drugs. To give an idea of the potential scale of this trade, Leggett mentions a police bust in California that broke up a ring of athletes who were smuggling steroids from one Mexican lab in Tijuana with a production capacity of \$70 million a year. The FDA and Justice Department launched a joint crackdown on the black market in 1986, with modest success since then. According to Leggett, about ten states are moving to outlaw the use of steroids to enhance athletic performance.

In 1976 the International Olympic Committee ruled that steroids, along with many other "doping" techniques, could not be used by athletes in the games, and that urine tests would be conducted to enforce the rule. Today, there are 3000 drugs on the proscribed list. Armed with very sophisticated chemical analyzers and firm determination, the Olympic officials netted eight frank steroid users this season and caused an equal number of athletes to withdraw from the games to avoid being tested.

The response from Johnson and his trainers sounded familiar to those in the testing business, including David L. Black, director of the Athletic Drug Testing Laboratory at Vanderbilt University. His lab does steroid testing for the National Football League



**Ben Johnson** of Canada won the Olympic 100-meter race with an explosive start, setting a world record. He was disqualified later for taking stanozolol, a muscle-building steroid.

and many college teams and is seeking Olympic accreditation.

At first, Johnson's camp said that there had been sabotage of the urine sample. Later, the story was that a drink may have been spiked or that medical therapy for a sore foot may have affected the test. After a few days' silence, Johnson said at a press conference that although "they said I tested positive" for stanozolol, "I have never knowingly taken illegal drugs, and I would never embarrass my family, my friends, my country, and the kids who love me." He took no questions. His doctor, George Astaphan, earlier had said he gave Johnson injections of cortico-steroids up until a few days before the race for a sore heel. These non-androgenic steroids are used to reduce inflammation, and they are permitted by the Olympic Committee if their use is reported in advance, as Johnson had done in this case.

According to Black, there is no credible explanation for Johnson's test results except the worst one—that he used stanozolol. It is possible now to detect traces of steroids at a concentration of one part per billion. In practical terms, Black says, this means that his lab can detect water-soluble drugs 4 days after use and fat-soluble drugs within 4 to 14 days. He knows of one case in which nandrolone, a fat-soluble steroid, was detected 13 months after use. Nandrolone is the one found earlier this year in the urine of Angel Myers, a U.S. swimmer who was barred from competing in the Olympics.

Robert Dugal, a member of the Olympic Committee's medical commission and member of Canada's National Institute of Scientific Research at Quebec University in Montreal, says that Johnson may have been tripped up by new technology. "Three years ago, athletes considered stanozolol undetectable," he says. The molecule contains a structural ring not present in other steroids, and only recently did reagents become available that make it possible to identify the compound unequivocally, even when present in tiny amounts. There was a second, damning piece of evidence in this case, Dugal says. Normally the Olympic Committee does not release information about an athlete's testosterone level, but in this case it made an exception because Johnson claimed his drink had been spiked. Analysis showed that his testosterone was 15% of the normal value, a fact that would be consistent with long-term steroid use, not a single incident of sabotage.

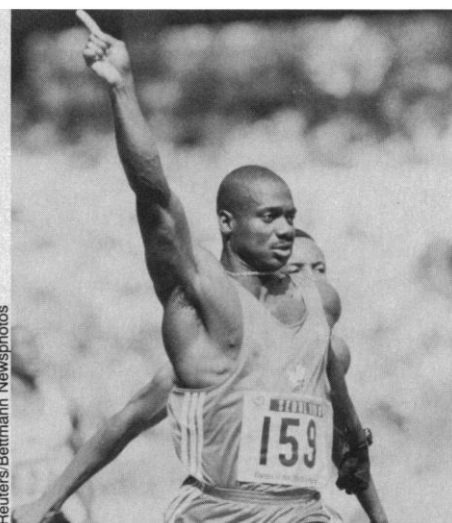
One odd aspect of the steroid problem is that despite anecdotal evidence to the contrary, the official medical line on steroids is that they do not help in athletics. The latest (1985) edition of L. S. Goodman and A. G. Gilman's *Pharmacological Basis of Therapeutics*,

for example, reports that "the use of these agents does not cause an increase in muscle bulk, strength, or athletic performance."

"It's a shame that that information is still floating around," says Black. "The medical community has lost a lot of credibility" by minimizing the power of steroids. This has led many users to think the official warnings about adverse effects are also unreliable. The problem with using clinical studies to study the phenomenon, it is agreed, is that they examine only therapeutic doses. Athletes sometimes use doses 10 to 100 times larger.

Jerome Jaffe, director of the Drug Addiction Research Center in Baltimore, says researchers are caught in a "Catch-22." They cannot say anything about the effects of using steroids at high doses without conducting an investigation, and they cannot investigate because it would be unethical to do so.

Recently, however, some physicians have



sifted the data again and come up with a new opinion. Herbert A. Haupt, an orthopedic surgeon in St. Louis, and his collaborator G. D. Rovere have found 14 well-documented studies supporting the thesis that steroids increase athletic performance and 10 that come down on the other side. The main difference between the two batches of research, Haupt argues, is design. Studies that found an effect examined athletes in a rigorous training regime. Studies finding no effect were less focused. "If you just take somebody off the street" and administer steroids, Haupt says, you may see nothing.

The Council on Scientific Affairs of the American Medical Association (AMA) cautiously endorsed this view in March 1988. It recognized that "certain benefits to athletic performance seem probable" with the use of anabolic steroids, including possibly a growth in "lean muscle mass." Strength may

be increased in some people if they are "in a continuing program of intensive exercise coupled with a high-protein diet." But the AMA remains neutral on the drug's reputed power to make users aggressive.

There is spotty evidence but no firm support for the popular view that steroids stimulate aggressive behavior. For example, Harrison G. Pope, Jr., a psychiatrist at Harvard's McLean Hospital in Belmont, Massachusetts, and his colleague David L. Katz published a report on "steroid psychosis" in the April issue of the *American Journal of Psychiatry*. They became interested in it after treating two patients who were hospitalized with hallucinations. The patients returned to normal months later, after they had stopped using steroids. Intrigued, Pope and Katz recruited 41 heavy steroid users from gyms on the East and West coasts and interviewed them. They found that 12% had had a "manic episode" and 12% had experienced "psychotic symptoms" while on anabolic steroids. They describe one man who, cut off by another driver in traffic, jumped out of his car and took a crowbar to the windshield of the offending vehicle. However, reports like this should be taken with a grain of salt, because 32% of the interviewees also reported "prior substance abuse" with marijuana or cocaine. The authors conclude that steroid abuse may indeed cause a form of madness, but the dose-effect relationship may elude study.

Haupt argues that the "greatest abuse of these things is not in competitive athletics but in the local health club." He conjures up a frightening world inhabited by young men whose identity and self-esteem are bound up in a "distorted body image"—that of the overdeveloped muscleman. They take steroids for cosmetic reasons and may become psychologically dependent on them, because they must continue taking the drugs to maintain their appearance. The psychological profile of this kind of abuser, Haupt believes, is a male parallel of the anorexia nervosa victim, and just as destructive. Heavy steroid users, he claims, may become sociopathic and injure others as well as themselves.

There is no firm estimate of the number of people who take anabolic steroids, but several experts in the field, including Black, say there are at least 1 million. Black worries that the demand for these drugs may be growing. He reports that in international competitions, 1% to 2% of the players now test positive for steroids; in college athletics, 5% test positive; and in professional football, a remarkable 7% to 8% test positive. According to Black, these percentages are the visible tip of an iceberg that is largely unobserved. ■ ELIOT MARSHALL