

American College of Sports Medicine

Position Statement on The Use and Abuse of Anabolic-Androgenic Steroids in Sports



Based on a comprehensive survey of the world literature and a careful analysis of the claims made for and against the efficacy of anabolic-androgenic steroids in improving human physical performance, it is the position of the American College of Sports Medicine that:

1) The administration of anabolic-androgenic steroids to healthy humans below age 50 in medically approved therapeutic doses often does not of itself bring about any significant improvements in strength, aerobic endurance, lean body mass, or body weight.

2) There is no conclusive scientific evidence that extremely large doses of anabolic-androgenic steroids either aid or hinder athletic performance.

3) The prolonged use of oral anabolic-androgenic steroids (C_{17} -alkylated derivatives of testosterone) has resulted in liver disorders in some persons. Some of these disorders are apparently reversible with the cessation of drug usage, but others are not.

4) The administration of anabolic-androgenic steroids to male humans may result in a decrease in testicular size and function and a decrease in sperm production. Although these effects appear to be reversible when small doses of steroids are used for short periods of time, the reversibility of the effects of large doses over extended periods of time is unclear.

5) Serious and continuing effort should be made to educate male and female athletes, coaches, physical educators, physicians, trainers, and the general public regarding the inconsistent effects of anabolic-androgenic steroids on improvement of human physical performance and the potential dangers of taking certain forms of these substances, especially in large doses, for prolonged periods.

Research Background for the Position Statement

This position stand has been developed from an extensive survey and analysis of the world literature in the fields of medicine, physiology, endocrinology, and physical education. Although the reactions of humans to the use of drugs, including hormones or drugs which simulate the actions of natural hormones, are individual and not entirely predictable, some conclusions can nevertheless be drawn with regard to what desirable and what undesirable effects may be achieved. Accordingly, whereas positive effects of drugs may sometimes arise because persons have been led to expect such changes ("placebo" effect) (8), repeated experiments of a similar nature often fail to support the initial positive effects and lead to the conclusion that any positive effect that does exist may not be substantial.

1) Administration of testosterone-like synthetic drugs which have anabolic (tissue building) and androgenic (development of male secondary sex characteristics) properties in amounts up to twice those normally prescribed for medical use have been associated with increased strength, lean body mass and/or body weight in some studies (6, 19, 20, 26, 27, 33, 34, 36) but not in others (9, 10, 12, 13, 21, 35, 36). One study (13) reported an increase in the amount of weight the steroid group could lift compared to controls but found no difference in isometric strength which suggests a placebo effect in the drug group, a learning effect or possibly a differential drug effect on isotonic compared to isometric strength. An initial report of enhanced aerobic endurance after administration of an anabolic-androgenic steroid (20) has not been confirmed (6, 9, 19, 21, 27). Because of the lack of adequate control groups in many studies it seems likely that some of the positive effects on strength that have been reported are due to "placebo" effects (3, 8), but a few apparently well-designed studies have also shown beneficial effects of steroid administration on muscular strength and lean body mass. Some of the discrepancies in results may also be due to differences in the type of drug administered, the method of drug administration, the nature of the exercise programs involved, the duration of the experiment, and individual differences in sensitivity to the administered drug. High protein dietary supplements do not insure the effectiveness of the steroids (13, 21, 36). Because of the many failures to show improved muscular strength, lean body mass, or body weight after therapeutic doses of anabolic-androgenic steroids it is obvious that for many individuals any benefits are likely to be small and not worth the health risks involved.

2) Testimonial evidence by individual athletes suggests that athletes often use much larger doses of steroids than those ordinarily prescribed by physicians and those evaluated in published research. Because of the health risks involved with the long-term use of high doses and requirements for informed consent it is unlikely that scientifically acceptable evidence will be forthcoming to evaluate the effectiveness of such large doses of drugs on athletic performance.

3) Alterations of normal liver function have been found in as many as 80 percent of one series of 69 patients treated

with C₁₇-alkylated testosterone derivatives (oral anabolic-androgenic steroids) (29). Cholestasis has been observed histologically in the livers of persons taking these substances (31). These changes appear to be benign and reversible (30). Five reports (4, 7, 23, 31, 39) document the occurrence of peliosis hepatitis in 17 patients without evidence of significant liver disease who were treated with C₁₇-alkylated androgenic steroids. Seven of these patients died of liver failure. The first case of hepato-cellular carcinoma associated with taking an androgenic-anabolic steroid was reported in 1965 (28). Since then at least 13 other patients taking C₁₇-alkylated androgenic steroids have developed hepato-cellular carcinoma (5, 11, 14, 15, 16, 17, 18, 25). In some cases dosages as low as 10-15 mg/day taken for only three or four months have caused liver complications (13, 25).

4) Administration of therapeutic doses of androgenic-anabolic steroids in men often (15, 22), but not always (1, 10, 19), reduces the output of testosterone and gonadotropins and reduces spermatogenesis. Some steroids are less potent than others in causing these effects (1). Although these effects on the reproductive system appear to be reversible in animals, the long-term results of taking large doses by humans is unknown.

5) Precise information concerning the abuse of anabolic steroids by female athletes is unavailable. Nevertheless, there is no reason to believe females will not be tempted to adopt the use of these medicines. The use of anabolic steroids by females, particularly those who are either prepubertal or have not attained full growth, is especially dangerous. The undesired side effects include masculinization (2, 29, 30), disruption of normal growth pattern (30), voice changes (2, 30, 32), acne (2, 29, 30, 32), hirsutism (29, 30, 32), and enlargement of the clitoris (29). The long-term effects on reproductive function are unknown, but anabolic steroids may be harmful in this area. Their ability to interfere with the menstrual cycle has been well documented (29).

For these reasons, all concerned with advising, training, coaching, and providing medical care for female athletes should exercise all persuasions available to prevent the use of anabolic steroids by female athletes.

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REFERENCES

1. AAKVAAG, A. and S.B. STROMME. The effect of mesterolone administration to normal men on the pituitary-testicular function. *Acta Endocrinol.* 77:380-386, 1974.
2. ALLEN, D.M., M.H. FINE, T.F. NECHELES, and W. DAME-SHEK. Oxymetholone therapy in aplastic anemia. *Blood* 32:83-89, July 1968.
3. ARIEL, G. and W. SAVILLE. Anabolic steroids: the physiological effects of placebos. *Med. Sci. Sports* 4:124-126, 1972.
4. BAGHERI, S.A. and J.L. BOYER. Peliosis hepatitis associated with androgenic-anabolic steroid therapy. *Ann. Int. Med.* 81:610-618, 1974.
5. BERNSTEIN, M.S., R.L. HUNTER and S. YACHRIN. Hepatoma and peliosis hepatitis developing in a patient with Fanconi's anemia. *N. Engl. J. Med.* 284:1135-1136, 1971.
6. BOWERS, R. and J. REARDON. Effects of methandrostenolone (Dianabol) on strength development and aerobic capacity. *Med. Sci. Sports* 4:54, 1972.
7. BURGER, R.A. and P.M. MAROUSE. Peliosis hepatitis, report of a case. *Am. J. Clin. Path.* 22:569-573, 1952.
8. BYERLY, H. Explaining and exploiting placebo effects. *Prosp. Biol. Med.* 19:423-436, 1976.
9. CASNER, S., R. EARLY, and B.R. CARLSON. Anabolic steroid effects on body composition in normal young men. *J. Sports Med. and Phys. Fit.* 11:98-103, 1971.
10. FAHEY, T.D. and C.H. BROWN. The effects of an anabolic steroid on the strength, body composition and endurance of college males when accompanied by a weight training program. *Med. Sci. Sports* 5:272-276, 1973.
11. FARRELL, G.C., D.E. JOSHUA, R.F. UREN, P.J. BAIRD, K.W. PERKINS, and H. KRAIENBERG. Androgen-induced hepatoma. *Lancet* 1:430-431, 1975.
12. FOWLER, JR., W.M., G.W. GARDNER, and G.H. EGSTROM. Effect of an anabolic steroid on physical performance of young men. *J. Appl. Physiol.* 20:1038-1040, 1965.
13. GOLDING, L.A., J.E. FREYDINGER, and S.S. FISHEL. Weight, size and strength-unchanged by steroids. *Physician Sports Med.* 2:39-45, 1974.
14. GUY, J.T. and M.O. AUXLANDER. Androgenic steroids and hepato-cellular carcinoma. *Lancet* 1:148, 1973.
15. HARKNESS, R.A., B.H. KILSHAW, and B.M. HOBSON. Effects of large doses of anabolic steroids. *Brit. J. Sport Med.* 9:70-73, 1975.
16. HENDERSON, J.T., J. RICHMOND, and M.D. SUMERLING. Androgenic-anabolic steroid therapy and hepato-cellular carcinoma. *Lancet* 1:934, 1972.
17. JOHNSON, F.L. The association of oral androgenic-anabolic steroids and life threatening disease. *Med. Sci. Sports* 7:284-286, 1975.
18. JOHNSON, F.L., J.R. FEAGLER, K.G. LERNER, P.W. MAJEMS, M. SIEGEL, J.R. HARTMAN, and E.D. THOMAS. Association of androgenic-anabolic steroid therapy with development of hepato-cellular carcinoma. *Lancet* 2:1273-1276, 1972.
19. JOHNSON, L.C., G. FISHER, L.J. SYLVESTER, and C.C. HOFHEINS. Anabolic-steroid: Effects on strength, body weight, O₂ uptake and spermatogenesis in mature males. *Med. Sci. Sports* 4:43-45, 1972.
20. JOHNSON, L.C. and J.P. O'SHEA. Anabolic steroid: effects on strength development. *Science* 164:957-959, 1969.
21. JOHNSON, L.C., E.S. ROUNDY, P. ALLSEN, A.G. FISHER, and L.J. SYLVESTER. Effect of anabolic steroid treatment on endurance. *Med. Sci. Sports* 7:287-289, 1975.
22. KILSHAW, B.H., R.A. HARKNESS, B.M. HOBSON, and A.W.M. SMITH. The effects of large doses of the anabolic steroid, methandrostenolone, on an athlete. *Clin. Endocr.* 4:537-541, 1975.
23. KINTZEN, W. and J. SILNY. Peliosis hepatitis after administration of fluoxymesterone. *Canad. Med. Assoc. J.* 83:860-862, 1960.
24. MCCREDIE, K.B. Oxymetholone in refractory anaemia. *Brit. J. of Haematology*, 17:265-273, 1969.
25. MEADOWS, A.T., J.L. NAIMAN, and M.V. VALDES-DAPENA. Hepatoma associated with androgen therapy for aplastic anemia. *J. Pediatr.* 84:109-110, 1974.
26. O'SHEA, J.P. The effects of an anabolic steroid on dynamic strength levels of weight lifters. *Nutr. Report Internat.* 4:363-370, 1971.
27. O'SHEA, J.P. and W. WINKLER. Biochemical and physical effects of an anabolic steroid in competitive swimmers and weight lifters. *Nutr. Report Internat.* 2:351-362, 1970.
28. RECENT, L. and P. LACY. (eds.). Fanconi's anemia and hepatic cirrhosis. Clinicopathologic Conference. *Am. Med.* 39:464-475, 1965.
29. SANCHEZ-MEDAL, L., A. GOMEZ-LEAL, L. DUARTE, and M. GUADALUPE-RICO. Anabolic-androgenic steroids in the treatment of acquired aplastic anemia. *Blood* 34:283-300, 1969.
30. SHAHIDI, N.T. Androgens and erythropoiesis. *N. Engl. J. Med.* 289:72-79, 1973.
31. SHERLOCK, S. *Disease of the Liver and Biliary System*, 4th Edition, Philadelphia: F.A. Davis, p. 371, 1968.
32. SILINK, J. and B.G. FIRKIN. An analysis of hypoplastic anaemia with special reference to the use of oxymetholone ("Adroyd") in its therapy. *Australian Ann. of Med.* 17:224-235, 1968.
33. STANFORD, B.A. and R. MOFFAT. Anabolic steroid: effectiveness as an ergogenic aid to experienced weight trainers. *J. Sports Med. and Phys. Fit.* 14:191-197, 1974.
34. STEINBACH, M. Uber den Einfluss anabolen Wirkstoffe und Korpergewicht Muskelkraft und Muskeltraining. *Sportarzt und Sport-medicin.* 11:485-492, 1968.
35. SAMUELS, L.T., A.F. HENSCHEL, and A. KAYS. Influence of methyltestosterone on muscular work and creatine metabolism in normal young men. *J. Clin. Endocrinol. Metab.* 2:649-654, 1942.
36. STORME, S.B., H.D. MEEN, and A. AAKVAAG. Effects of an androgenic-anabolic steroid on strength development and plasma testosterone levels in normal males. *Med. Sci. Sports.* 6:203-208, 1974.
37. WARD, P. The effect of an anabolic steroid on strength and lean body mass. *Med. Sci. Sports* 5:277-282, 1973.
38. ZAK, F.G. Peliosis hepatitis. *Am. J. Pathol.* 26:1-15, 1950.
39. ZIEGENFUSS, J. and R. CARABASI. Androgens and hepato-cellular carcinoma. *Lancet* 1:262, 1973.