Bureau of Voluntary Compliance Seminar
ANABOLIC STEROIDS
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Introduction

I'd like to thank Tom for that excellent introduction. He really opened several windows from which I can begin my talk.

Testosterone and its synthetic analogs have had a checkered history. It is rumored that the first systematic, non-clinical, use of anabolic steroids was by the German army in the 1940's. Strange you might think, but it was used to increase aggression in combat troops. At about the same time on the other side of the Atlantic, Paul DeKruif, a writer for *Readers Digest* created quite a stir amongst the more elderly males of the publication's readership by discussing the function of the male hormone testosterone, in restoring lost sexual vigor and youthful activity. Mankind, of course, has always been intrigued with anything that might remotely promise eternal youth. Two or three years ago I had a conversation with a twenty-one year old weight lifter. We were discussing the side effects of anabolic steroids after we had both completed our workouts in the weight room. His comment concerning side effects was: "I figure I can lift till I'm forty, so what if I die after that?"

These contrasting examples point out that anabolic steroids are not inert substances that only assist muscle tissue in growth. There are clearly other factors involved when males and females use anabolic steroids. My talk will attempt to outline those factors.

The central thesis of my presentation will address two issues. First, the use of anabolic steroids, how they are used, which individuals use them and what other substances are used concomitantly. Second, and equally important, is the addictive potential of anabolic steroids, and the formation of a distinct drug culture associated with anabolic steroid use.

The Prevalence of Anabolic Steroid Use

Before detailing those topics, how prevalent is the use of anabolic steroids? I think that Dennis Degan will elaborate on the issue of prevalence, however, let me offer some initial figures. Conservatively, one million Americans, both males and females from high school age upward into their 50's, use anabolic steroids for a variety of reasons. Two years ago documented sources estimated that this use generated a one hundred million dollar a year black market industry.

Who are the users though? They're not necessarily the "muscleheads," they're not ignorant individuals who don't know anything better. Some of these individuals are lawyers, physicians, pharmacists and accountants. I say that with authority, because I have met each of those individuals in gyms around the nation. Elite athletes prior to the mid-1970's were virtually the sole users of these drugs. Anabolic steroid use is not related to the need, that perhaps the press will have you believe, of American athletes to keep up with the performance of Soviet block athletes. From a sport science and training theory perspective, the Soviet block countries use lower dosages of ergogenic substances to enhance performance than do American athletes. American athletes tend to be the primary *abusers* of these substances because of a limited medical supervision and training structure. Drugs appear to be *used* systematically in the eastern block sports system with appropriate monitoring.

No longer are anabolic steroids the domain of the elite athlete. The growth at the base of the pyramid of anabolic steroid users is one of the negative effects of the fitness boom since the 1970's. Now, non-elite athletes, those who never compete in any sports, constitute the majority of those who use anabolic steroids.

Do "athletes" take anabolic steroids? This seems to be a reasonable question to address before proceeding any further. At the 1983 PanAmerican Games traces of anabolic steroids were detected in the bodies of a number of American athletes. I was quite surprised at the reaction of the media and the shock value attached to these "revelations". Perhaps I shouldn't have been. Between 1968 and 1978 I competed in track and field at both national and international levels in the discus. I did not realize until I was preparing for this talk that I am in fact, an artifact of history. I have been in and around the use of anabolic steroids since the 1960's. I continued to observe very closely the use of anabolic steroids in the 70's and have watched the phenomenal growth in their use occur in the 80's. Presently, the majority of anabolic steroid users never compete in organized sport. Do "athletes" take anabolic steroids? No. For the sake of simplicity, however, please permit me to use the term "athlete" to depict anabolic steroid users for the remainder of this presentation.

Health club users of anabolic steroids cannot easily justify any cost-benefit trade-off in using these drugs as might the Olympic *athlete*. Those with average genetics are limited in the benefits they can derive from using

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anabolic steroids. The health club or high school users of anabolic steroids place themselves at risk for minimal rewards.

Sources of Anabolic Steroids

How are anabolic steroids obtained by "athletes"? Fifteen to twenty percent of anabolic steroids are obtained from either sympathetic or uninformed or unethical physicians, pharmacists and veterinarians. The other 80 percent are obtained from a well-organized black market.

Two years ago I was able to obtain a computer printout of the available supply of black market anabolic steroids from a particular source running an organized mail order industry. The steroids are either mailed across the country in the U. S. Postal System, carried, or distributed through local outlets. Some of these anabolic steroids come in from Europe and carry a premium price. Mexico, however, has been a major source.

Some are produced by backyard manufacturers. Obviously there is no quality control at this level of manufacture. The consumers of drugs produced at this level buy quite a high percentage of placebos, in containers with professionally printed counterfeit labels.

The Function and Efficacy of Anabolic Steroids

Why do athletes take anabolic steroids? We have already heard from Tom that anabolic steroids facilitate recovery from training. *Any sport* that requires adaptation to muscular work loads is a suitable candidate for the use of anabolic steroids. As a consequence I have met marathon runners who have used anabolic steroids. In 1972 the eastern European women's swimming team won one bronze medal. In 1976 it won ten out of eleven gold medals. I tend not to think that was due only to an increase in coaching ability!

Anabolic steroids also increase the ability to train intensely, which will lead to greater performances. Anabolic steroids are not an easy option. They do not make life easier for the athlete, they merely raise the baseline level of performance. You heard Tom indicate that anabolic steroids do work. From my personal experience I would estimate that a ten percent improvement in physical performance can be derived from relatively small dosages of anabolic steroids (10 to 15 milligrams per day). In the 1970's, however, the medical community denied that anabolic steroids increased performance, and the data at that time did not clearly indicate that anabolic steroids increased performance. One athlete, detected and banned from competition for anabolic steroid use, sued the U.S. Olympic Committee on the grounds that, according to the available data, anabolic steroids did *not* give him an unfair advantage.

At one time manufacturers inserts contained a statement to the effect that: "Anabolic steroids do not enhance athletic performance." I am not sure if this is still the case today. Only in late 1984 did the American College of Sport Medicine acknowledge that anabolic steroids, when combined with progressive resistance training and a diet high in protein, increase muscular size and strength. Today, then, it is acceptable to admit that anabolic steroids work.

During this long period of denial by the medical and pharmaceutical communities a sophisticated level of knowledge was being acquired at the "street" level. Today the knowledge base, it appears, does not rest in the hands of research institutions in this nation. Arguably, it is contained within the complex trial and error information network, based on thousands of trials, a great deal of word of mouth communication and underground documentation. Some of the information that body builders, for example, base their drug regimes on is probably quite credible. Other information may be completely fallacious and may be causing serious physiological and psychological harm. In June, 1985 I found a physician asking an elite body builder the best way of using anabolic steroids in his (the physician's) training regime. This is an unacceptable state of affairs. There is a desperate need for research in the area of anabolic steroids to return the knowledge base unequivocally to the hands of the professional communities.

The Use of Anabolic Steroids

How do athletes use anabolic steroids? (See Attachment A) Let's take a look at six case studies that I believe are representative and typical of the methods and dosages employed by anabolic steroids users. This data is part of a study I conducted with Fernhall and Walters[1] in which we examined blood chemistry profiles in anabolic steroid using body builders who were dieting for competition, anabolic steroid using weight lifters who were not dieting, and a control group. A total of 27 athletes were involved in the study during a nineteen week period. The dosage data was obtained during structured interviews conducted by a trained participant observer.

Case #24 is taking two injectable steroids along with one oral steroid during an eight week cycle. Anabolic steroid users take steroids in cycles, the rationale being that they know there are side effects, and by cycling on and off anabolic steroids, the side effects are minimized. You will note that the drug dosages across the eight week period increase dramatically until the last two weeks when 1100 milligrams from the three sources of anabolic steroids are being consumed weekly. Athletes refer to this system of using two or more anabolic steroids as "stacking." Athletes "stack" anabolic steroids to achieve

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[1]Dirkin, G.R.; Fernhall, B.; and Walters, M. Anabolic Steroid Use, Diet and Health Risk. Manuscript in preparation.

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a synergistic effect, the combined effect of the drugs magnifies the overall effect. This synergistic effect is believed to further enhance performance. We do not have adequate data to support or refute this belief.

Case #23 is an elite body builder. He is using a technique called "stagger stacking." This technique employs anabolic steroids that are believed to contain higher androgenic properties in the early phases of a body builder's cycle and those with greater anabolic properties in the latter phases. We have already heard in Tom's presentation that water retention is a side effect of anabolic steroid use. For the majority of athletes, this is particularly the case with the more androgenic steroids. Body builders cannot afford to have water retention because it interferes with the ability to display their muscles in competition. Case #23 is taking four injectable and two oral anabolic steroids and is utilizing the stagger stacking technique. Two out of the four injectable steroids are from veterinary sources.

The health consequences for Case #23 can be partially assessed by taking a look at his blood chemistry profile (See Attachment B). Those of you familiar with these indicators will recognize that total cholesterol is high and HDL cholesterol very low. The LDL/HDL ratio one would like to see in this outwardly healthy male in his mid-20's would be between 2.5 and 3.5. In this case this ratio is 43.5 and 32 respectively. There is some evidence of compromised liver function with a mildly elevated SGOT. The high CPK indices are representative of the degree of muscle trauma caused by the high training loads this athlete is under. Anabolic steroids contribute to this level of training.

Steroids, in the short term at least, place the athlete at risk as the data for Case #23 exhibits. While Case #23 may not be representative, his use of anabolic steroids is not atypical. Many users of anabolic steroids may demonstrate similar risk profiles.

The Use of Other Drugs

Together with anabolic steroids, many athletes use other performance enhancing drugs. Athletes in our study used diuretics, thyroid and metabolic stimulators, primarily to reduce water retention and subcutaneous body fat. Human chronic gonadotrophin (HCG) is commonly used in the off-cycle to promote the production of endogenous testosterone, although in the groups we studied there was no reported use of HCG or no evidence of "tapering," the systematic reduction in anabolic steroid dosage toward the end of each cycle. Other drugs are used on an individual basis to reduce side effects. One for example, would be estrogen inhibitors to reduce the effects of gynecomastia, which is the accumulation of tissue under the nipples. Although normally this condition is benign it might be speculated that anabolic steroids may expose males to breast cancer.

In addition to performance oriented drug use, "recreational" drugs were also used by the subjects in our study. These subjects reported using marijuana, cocaine, alcohol, and large doses of caffeine. This use may or may not be higher than similar socio-economic groups of the same age. Two athletes had used hallucinagenics. It is interesting though, that they were using hallucinagenics not for "recreational" purposes. They ingested these drugs prior to a workout because they wanted to see if the drug would reduce inhibitive behavioral constraints associated with normal levels of consciousness prior to attempting a personal record in the squat!

Side Effects

The side effects in our study included acne, edema, sleeplessness, aggression, irritability, gynecomastia, decreased HDL cholesterol, and abnormal liver function. The "polypharmacy" associated with anabolic steroid use presents an unenviable task for the physician confronted with the diagnosis of a health problem that an athlete may have encountered. The athlete, however, legitimizes potential health risks by arguing that the benefits of anabolic steroid use outweigh the costs. As we will discuss in a moment, these values are strongly supported by the athlete's peer group. It is also apparent that main stream cultural values serve as a poor reference point for these individuals and for those who wish to judge their actions.

The Addictive Potential of Anabolic Steroid Use

I would now like to move into the second part of this presentation and address the addictive potential of anabolic steroids. When you have a group of individuals who are prepared to take the kind of drug dosages that have been presented today, it leads one to question whether something other than mere performance is motivating the decision to continue to use high dosages of anabolic steroids.

First, the majority of athletes *enjoy* taking anabolic steroids. Seldom do I find an athlete, a college football player for example, who felt the only reason for taking anabolic steroids was to remain on the starting lineup. Second, the nature of cycling on and off of anabolic steroids has critical sociological, psychological, and physiological consequences for the athlete and as such presents a multifactorial problem requiring complex analysis.

Physiological Factors

Let's take a look at each of the components. First the physiological system is faced with relatively frequent and often drastic hormonal changes. The anabolic steroids user, particularly the female, is introducing something into the system that dramatically exceeds baseline values. Primary drives increase and decrease as athletes cycle on and off anabolic steroids. Steroid users are hungrier, their

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sex drive is higher when taking anabolic steroids, and when off the drug the reverse is encountered. When on the drug it seems that you are returning to a more primitive level of functioning. From a bioanthropological perspective the drugs equip the individual with the readiness of the hunter. In this vein some individuals have reported that their visual acuity and sense of smell increases, a perceptional distortion that is difficult to validate.

Psychomotor efficiencies and inefficiencies occur as cycling of anabolic steroids take place. Achievement of physical performance goals become a reality because the athlete is more powerful, has greater speed and coordination. The reverse of the situation is true when off the drug. Kinesthetic sensation, the awareness of musculoskeletal movement is pronounced on the drug. You are perhaps aware, or have observed, that body builders seem to be constantly flexing. The user is constantly aware that his or her body is *alive,* consequently attention is turned inward to self.

Psychological Factors

When discussing the addictive potential of anabolic steroids the second major group of variables falls under the psychological components. Obviously when the physiological drive state changes swings in motivation are likely to occur. Motivation is high when on the drug and low when off the drug. The significant hormonal changes associated with anabolic steroid cycling produce large mood swings ranging from a euphoric state while using anabolic steroids to something approaching clinical depression at cessation. Anabolic steroid users desire to experience these frequent euphoric states and avoid depression. The drug induced euphoric state is tremendously appealing; it is grieved for in the off-cycle and is intricately linked to understanding the addictive spiral that some athletes encounter by either extending the "on" cycle or shortening the "off" cycle. The psychological high achievable when on steroids is stripped away when off steroids.

The state of grieving for the high is a crucial element in understanding addiction to anabolic steroids. In-depth interviews, even with athletes who have not taken the drugs for five or ten years, consistently reveal the sense of affection or longing for the psychological high of the drug. This seems to be the single most frequently reported factor that influences desire to return to the drug, or the inability to break from the drug cycle. Everything the athlete values is reinforced when the athlete is on anabolic steroids, consequently, significant increases and decreases in self-esteem occur as the athlete cycles on and off the drugs.

One issue that is frequently discussed on the topic of anabolic steroid use is the increase in aggression. Anabolic steroids do generally increase aggression. This does not necessarily mean that all users will demonstrate violent behavior. Hostile aggression, where the goal is to intentionally harm another human being is a limited social psychological definition of aggression. Anabolic steroids are as likely to produce increases in instrumental aggression (where there is intent to harm but for the purpose of winning) or merely assertive behavior (where there is *no* intent to harm but there are significant increases in effort and motivation). Those individuals, however, who may be pre-disposed to violent behavior are placing themselves and others at risk by taking anabolic steroids.

Sociological Factors

The third major set of variables that contribute towards addiction are the sociological. We are rewarded from childhood for an athletic muscular body. Our children consume "He Man," "Masters of the Universe" and "Hulk Hogan" on our television screens. The image of masculinity is important for us as a society; particularly to the youth. The peer group of the anabolic steroid user reinforces the values of strength and size. For the female anabolic steroid user the peer group is particularly important. As the female user becomes further removed from the normal definition of what a female should look like, the need to receive support from the anabolic steroid peer group tends to increase.

Overall there appears to be a change to a more macho lifestyle. For example, when the "Rambo" movies were released more army uniforms appeared in the gyms around the country. I have suggested to students that an interesting study would be to assess the correlation between the brake horse power of the cars in the parking lot outside gyms frequented by anabolic steroids users. I would predict a high positive correlation between anabolic steroid use and powerful, fast cars or motorcycles! The issue here is one of lifestyle. Wearing particular styles of jewelry, necklaces, bracelets, belts and apparel are associated with the development of a distinct subculture.

Macho behavior, linked to the steroid induced euphoria, produces a strong degree of egocentrism. By way of example, the last time I attended a body building competition there was a wide range of outrageous forms of apparel worn by the audience. There are some extremely novel ways that you can find to dress when you've got a body 2.5 times normal size!

The Behavioral Spiral

For the anabolic steroid-using athlete the gym, and its associated social activity, become his/her focal point. The subcultural values and mores reinforce the physiological and psychological drug effects. The cumulative effect of the physiological, psychological and sociological influences combine to create a milieu for the anabolic steroid user that is potentially highly addictive. The desire to return to the "crest of the wave" consistently reported by the anabolic steroid user places that individual at an

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increased level of health risk, both physiologically and psychologically.

For example, an elite power lifter who has advanced cardiovascular disease was asked if in looking back at his career he would take these drugs again. He replied by indicating that the past was not his chief concern, but that he may *still* decide to take them in the future. Another example of someone who did not learn quickly enough was a New Zealand discus thrower. They used to call him the ''Doctor'' because of the black bag he carried with him to track meets. He died at the age of 42, four years after retiring from competition. He was unable to give up the culture, the physiological and psychological state associated with anabolic steroids and continued to take the drugs in high dosages during his short ''retirement''.

For the non-steroid using athlete and would-be researcher, entry into the subculture is restricted. Drs. Pope and Katz recently published an article in the *American Journal of Psychiatry* on the frequency of affective and psychotic symptoms in athletes taking anabolic steroids.[2] Their beginning effort in this area is appreciated, however, they admitted their findings to be primarily descriptive and not necessarily representative of anabolic steroid users as a whole. They concluded that ''despite our considerable efforts only a minority of steroids users were willing to be interviewed. Thus, we suspect that we were getting only a glimpse of a large underground subculture. . . . . Only by observing the effects of these drugs in natural settings, in doses and combinations used by athletes, are we likely to understand them.'' I hope in the brief time available today I have elaborated upon the phenomenology of anabolic steroid use. My observations have been made over a long period of time both inside and outside a subculture which has stringent barriers to entry.

I would like to close today referring to Hafen and Peterson's[3] four criteria used to define drug *abuse*. First, the use of drugs in forms, styles and situations which are illegal; second, the use of drugs without appropriate medical approval or in excess of acceptable standards of self-medication; third, the use of drugs in such a way that the users control of ingestion or behavior are excessively affected and fourth, the use of drugs in the pursuit of potential hazardous states of consciousness or mood. I hope I have convinced you that all four of these criteria are met by the user of anabolic steroids.

Anabolic steroids place the user at risk physiologically and psychologically, they have the potential to be addictive and the habitual user operates within a defined drug culture. This synopsis, however, fails to underscore one issue: *People* use anabolic steroids. A sad statement was made by one female user of anabolic steroids when discussing her employee benefit package. She commented in a voice deeper than mine, ''What the hell do I need maternity benefits for?''

The problem of anabolic steroids is large and multifaceted, it is escalating and appropriate controls are necessary.

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[2]Pope, H.G. and Katz, D. L. (1988) Affective Disorders and Psychotic Symptoms Associated with Anabolic Steroids Use. *American Journal of Psychiatry*, 145:4 pp 487-490.

[3]Hafen, B.O. and Peterson, B. (1978) *Medicine and Drugs*, Philadelphia: Lea and Febiger.

Attachment A*

Case	Drug Used	Propriatary Name	Usual Adult Weekly Dosage*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
											Weekly Dosage (mg.)											
#1	Methandrolstenolone	Methandrolstenolon	50 mg. 1M								50	50	50	50	50	50	50	50				
Body Wt 84kg.	Methandrolstenolone	Metatestenol®	14-140 mg. P.O.								50	50	50	50	50	50						
	Nandrolone Deconate	Deca-Durabolin®	25 mg. 1M								200	200	200	200	200	200	400	400	400	600	600	600
#2	Nandrolone Deconate	Deca-Durabolin®	25 mg. 1M				300	300	300	300	300	300										
Body Wt 92kg.	Oxymetholone	Anadrol-50®	35-70 mg. P.O.										700	700	700	700	700	700				
	Oxandrolone	Anavar®	35-70 mg. P.O.				35	35	35	35	35	35										
	Trenbolone	Parabolan®	— 1M										150	150	150	150	150	150				
	Testosterone Cypionate	Andronate®	100 mg. 1M				600	600	600	600	600	600	600	600	600	600	600	600				
#16	Boldenone Undecylenate	Equipoise®	Vetrinary, 1M	100	100	100	100	100	100	100	100	100										
Body Wt 92kg.	Ethylestrenol	Maxibolin®	14-28 mg. P.O.										56	56	56	56						
	Nandrolone Deconate	Deca-Durabolin®	25 mg. 1M														300	300	300	300	300	300
	Stanozolol	Winstrol-V®	Vetrinary, 1M														125	125	125	125	125	125
	Testosterone Cypionate	Andronate®	100 mg. 1M	600	600	600	600	600	600	600	600	600										
#21	Ethylestrenol	Maxibolin®	14-28 mg. P.O.								42	42	42	84	84	84	126	126	168	168	168	
Body Wt 90 kg.	Stanozolol	Winstrol®	28-72 mg. P.O.								42	42	42	84	84	126	126	126	168	168	168	
	Stanozolol	Winstrol-V®	Vetrinary, 1M																300	300	400	300
	Trenbolone	Parabolan®	— 1M								150	150	150	340	225	450	225	225				
	Trenbolone Acetate	Finaget®	Vetrinary, 1M																45	45	60	45
#23	Boldenone Undecylenate	Equipoise®	Vetrinary, 1M														100	100	100	100	50	50
Body Wt 82kg.	Methandrolstenolone	Methandrolstenolon	35 mg. oral								105	105	105	35	35	105	105	105				
	Nandrolone Decanate	Deca-Durabolin®	25 mg. 1M								200	200	200	200	200	200						
	Oxymetholone	Anadrol-50®	35-70 mg. P.O.											350	350							
	Stanozolol	Winstrol-V®	Vetrinary, 1M													200	200	200	200	200	200	200
	Trenbolone	Parabolan®	— 1M																125	125	125	125
#24	Clostebol Acetate	Steranabol®	80 mg. 1M							100	100	100	100	100	100	100	100					
Body Wt 98kg.	Oxymetholone	Anadrol-50®	35-70 mg. oral							175	175	350	350	350	350	700	700					
	Testosterone Cypionate	Andronate®	100 mg. 1M							100	100	200	200	200	200	300	300					

* From: Dirkin, G.R.; Fernhall, B.; and Walters, M. Anabolic steroid use, diet and health risk. Manuscript in preparation.

Attachment B*

	CHOL	TRI	LDL	HDL	VLDL	CHOL/HDL	LDL/HDL
Test 1	294	135	261	6	27	49	43.5
Test 3	337	200	288	9	40	37.4	32.0

	o/o FAT
Test 1	10.2
Test 3	6.6

	Potasium	Alkeline Phosphate	SGOT	LDH	CPK
Test 1	4.4	63	75	226	1632
Test 3	5.3	57	127	308	2272

* From: Dirkin, G.R.; Fernhall, B.; and Walters, M. Anabolic steroid use, diet and health risk. Manuscript in preparation.