

FREEDOM OF CHOICE - STEROIDS - YOU MAKE THE CHOICE



An informational booklet on anabolic steroids and the possible positive alternatives to their use.

by

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FOREWORD

The use of steroids is not only unhealthy, it is unfair. Using a chemical to gain an advantage over an opponent is cheating -- plain and simple. High school athletics is supposed to represent fair play, team work, integrity, and honesty. One coach summed up what high school athletics meant to him by telling his team, "Winning is for a day, it is a passing thing. However, honesty and fair play .. being a good sport is a life-time matter." Using steroids will never make someone a winner. An athlete may win a competition or two through the use of the drug, but they risk losing their eligibility, their self-respect, their health, and very possibly their life.

The use of steroids has been described by some as being a unique substance problem because the users are motivated to improve themselves or to reach a positive goal. Steroid use is also a unique problem because some parents, coaches, and other well meaning people are putting pressure on young people to use these drugs. The pressure may not be intentional, but in many cases it is there. Winning and being the best is touted as being desirable, yet often times society sends athletes a mixed message on how to accomplish those goals. We discourage steroid use, but we praise athletes for being bigger, stronger, and faster. We encourage athletes to be their best naturally, yet, we don't always give them the information they need to accomplish that goal.

Too often society dwells on the negative issues that surround a subject. This has certainly been the case with steroids and athletics. We must deal not only with the negative aspects of steroid use, of which there are many, but, also with the positive alternatives to their use. If one has the proper knowledge about nutrition, training techniques, and other good health practices **it is possible** to get bigger, stronger, and faster without the use of steroids.

This booklet on steroids, and possible positive alternatives to their use, has been written because there is a need to get information into the hands of high school coaches, student-athletes, and parents. The use of steroids in high schools across this state, and across this nation, is not diminishing, but is on the increase. Two major factors for this increase may be that high school students are informed about the supposedly "positive" effects of steroids much more often than they are about the negative effects, and the people who are in a position to discourage steroid use often are not knowledgeable about the drugs. This booklet is certainly not a "cure all" for the steroid problem at high school level. It is, however, an attempt to provide factual, concise information on the issue of steroids.

The challenge for every person in society, especially those associated with athletics, is to impress upon young people that we truly are our best when we are drug free. Drug free means steroid free.

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Chapter 1

A HISTORY

Steroids, or anabolic-androgenic steroids as they are medically called, are not a phenomenon of the 1980s. Neither is the use of performance-enhancing drugs new or unique to the world of sports. One of the earliest reported cases of drug use in sports was at a swimming competition in Amsterdam in 1865. The first recorded drug-related death occurred to a cyclist in 1886. The first synthetic steroid was produced in 1935 by Yugoslavian chemist Leopold Ruzicka.(1) It is believed that these steroids were first used among Adolf Hitler's German troops. The intent was to increase aggressiveness and, thus, gain an advantage over enemy troops.(2)

It seems that - since the International Olympic Committee's ban of steroids in 1975 and subsequent testing in 1976 - the use of steroids has been more publicized and seemingly more widespread. It may be the IOC's ban that has caused some of the publicity, but it certainly would not be the ban that caused steroid use to become more widespread. Rather, it seems to be society's attitude, an attitude of win at all costs, that has led to the widespread use of steroids by professional, collegiate, high school, and even junior high school athletes.

Anabolic-androgenic steroids are artificial derivatives of the male hormone, testosterone. Steroids promote tissue growth by creating protein and other body substances.(3) Dr. John Ziegler, the American weight lifting team's physician in the 1950s, was the impetus behind the development of steroids in the United States. After learning of the use of anabolic steroids among Soviet Union athletes during the 1956 World Games, he worked with a pharmaceutical company in the United States and developed the steroid called Dianabol. For a short time after the development of Dianabol he tested it on several of America's top weight lifters. After seeing the adverse effects he tried to stop its use, but to no avail. Anabolic steroids were introduced to American athletes, and their use has had a tremendous impact. Before his death in 1983 Dr. Ziegler is quoted as saying, "I wish I had never heard of the word `steroids'. These kids don't realize the terrible price they are going to pay."(4)

In recent years, more than at any other time in history, it seems that society has taken to heart Vince Lombardi's statement, "Winning is not everything; it is the only thing." Coaches, parents, spectators, and athletes themselves have put a major emphasis on winning and being the best. That emphasis has gone beyond sacrificing grades, family time, and social time to sacrificing the athlete him or herself. We have indeed entered the "steroid era".(5) And it is an era when no price is too great to pay for victory -- not even the price of life itself. Several young athletes have already died because of steroid use and others have been devastated for life, both mentally and physically. These deaths in recent years may be the first, but they most certainly won't be the last. Athletes who are in their prime must ask themselves whether winning is worth a human life!

Today, it is apparent there is no age group immune to the use of steroids. Steroid use appears to be wide-spread among professional and amateur athletes alike. Recent surveys show that possibly as many as one-half million high school students in the United States have been or are involved in steroid use. Surveys also indicate that as many as one-third of those high school students may have started their steroid use in junior high.(6) In January, 1990 the Iowa High School Athletic Association conducted a survey of high school male athletes throughout the State of Iowa. The results of this survey, randomly conducted at schools of various size, indicate that four percent of these male student-athletes responded they had used steroids at some point during their high school career.(7) Why this deep interest in steroids, and do steroids really work? Yes, they really work, but the answer is more complex than that. If we were dealing simply with improved athletic performance, it could be dealt with somewhat effectively, but that is not the whole issue.

Athletes use steroids to become bigger, faster, and stronger more quickly than they could naturally. Many people, especially young athletes, believe they are invincible. This belief leads them to believe the short-term benefits of steroids can be theirs without the adverse effects. This simply does not seem to be true. Athletes and other steroid users must understand that the gains in size, strength, and speed without the use of performance-enhancing chemicals might take longer, but they will also last longer and have no adverse effects. When college scholarships and professional sports contracts are on the line, some athletes decide to ignore the negatives and concentrate only on what they see as positives. It has even been reported that some parents condone or encourage the use of steroids by their sons who may have a scholarship in the wings. These parents and the athletes themselves need to know that only one in 12,000 high school student-athletes will make it to the major leagues.(8) Hard work, dedication, and desire seem to play a bigger role in being successful in the major leagues than does the use of steroids. The rewards of athletic success are certainly great, but that is not the only reason people use steroids.

Non-competitive athletes and non-athletes also use steroids. The main reason these people use steroids is for cosmetic purposes. They want to look good! Let's face it -- big muscles are in! It is estimated that a significant percentage of steroid abusers are non-athletes. People strive for the "Rambo" look because they don't want to be called "wimps".(9) Many women are not shy in expressing their opinion that "handsome means muscular". What better way for men to get immediate gratification from the opposite sex than to become stronger and bigger quickly. The medical community may be partly to blame also. Until the early 1980s the medical community's official position was that steroids did nothing to help develop size, strength, and speed. The reason for this position was that the studies done by the medical community were conducted using therapeutic doses of the drug. Recreational users of the drug were, and are, taking 20 - 100 times, or more, the recommended therapeutic dosages.(10) Anabolic steroid users apparently tend to believe the old adage, "if a little is good, more must be better". The reality is that for decades before the medical community was willing to officially accept steroids as performance-enhancing, recreational users knew what the drugs were capable of, in terms of developing size, strength, and speed.(11) Therefore, when the medical

community came forward stating the negative effects of steroids, recreational users thought this was just another ploy to curtail the use of the drugs.(12) Even though the negative effects are still being researched and documented, it would seem safe to say that steroid use does have definite adverse effects.

Another reason anabolic steroid use is so difficult to stop is their availability. Even though steroids are controlled substances and supposedly legally available only through a prescription, many people who frequent health clubs and gyms know they are easily available for anyone who wants them. The income from black marketing steroids is estimated to be between \$100 million and \$250 million dollars a year in the United States! (13) Much of this black market production starts in clandestine labs in the U.S. or in countries such as Mexico, where steroids are available over the counter.(14) The illegal use and distribution of steroids is a federal crime in the United States. Distribution is a felony which can carry a three-year prison term and a fine up to \$250,000. The prison term doubles for distribution to minors.(15)

During the past two years several organizations have taken the lead in attempting to deter the use of steroids, especially among high school students. The National Federation of State High School Associations(NFSHSA), which is the national service and regulatory organization for high school athletics and activities, has taken a stand against steroid use. In early 1989 the NFSHSA developed the following statement in regards to steroids:

Anabolic steroid use at the high school level is of grave concern. Steroids are used by some athletes in sports, and the seriousness of the problem has been well documented recently.

High school coaches may not be able to prevent the use of steroids altogether, but they can clearly and forcefully discourage their use. Coaches should take a proactive role. First, they should learn about steroids, what they will do and what they will not do. Then they should provide this information for their athletes. Steroid use can, with proper diet and weight training, increase muscle development; however, as is typical with most get-rich-quick schemes, steroid use has serious short- and long-term consequences that must be addressed.

Normal and equal musculature development can occur without steroid use. Although the natural process takes longer, muscle tone without steroid use will last longer and does not carry the harmful side effects of the drugs.

Most coaches would not promote steroid use intentionally. Total silence by coaches, however, condones use in some young people's minds. Steroids may not be mentioned when it is suggested to an athlete that his/her success is limited only by lack of weight and/or strength. Without a disclaimer, however, the statement can be a motivation to use steroids. The pervasiveness of the drugs that allow for development of increased weight under the afore-mentioned circumstances is a coercive power that is difficult for the individual to resist without knowing what the side effects of the drugs may be.

The issue impacts the integrity of your sport. The use of steroids in sports is considered to be cheating. We stand opposed to the use of steroids by athletes and all members of the student body because of health and ethical concerns.(16)

In the State of Iowa several new and exciting events have occurred to deter the distribution and use of steroids by high school students. In March of 1990, Iowa's Governor Terry Branstad signed into law a bill which was unanimously passed by Iowa's House of Representatives and Senate, increasing the penalty for distribution of steroids to minors. The bill makes the unlawful distribution of steroids to minors an aggravated misdemeanor. The penalty upon conviction is a maximum of two years imprisonment and/or a fine not to exceed five thousand dollars.(17)

The Iowa High School Athletic Association has also taken a stand against the use of steroids. As of September 1, 1990, the Athletic Association considers the use of steroids by athletes to be a violation of good sportsmanship. The use of steroids by high school athletes could result in a one year period of ineligibility from all high school sports.(18)

People buying steroids also need to be aware that because the drugs are sold through the black market many of them may be counterfeit. If this only meant that the buyer was out a few dollars, it would be of no great concern, but the dangers can be worse than that. Some of these counterfeits contain stimulants and/or other drugs, and may carry adverse effects not associated with the use of steroids. Because most black market steroid containers have no markings on them, people do not always know what drug they are getting.

Many athletes believe that the use of steroids will make them a winner. They are wrong! Steroids do not make someone a winner; the athlete makes him or herself a winner. The athlete is the one with the dedication, desire, and commitment to do what it takes -- within the rules -- to become a winner. An athlete may win a competition or two through the use of steroids, but they are not only cheating others, they are cheating themselves as well. They are cheating themselves out of the knowledge that they could have played within the rules and been the very best they could be. Athletics is meant to be more than wins and losses; athletics is meant to build character and instill values and ethics in the participants and spectators.(19) What values and ethics do people learn by cheating and breaking the rules? Whatever the answer, it certainly is not something positive that people can take with them throughout life.

A high school football coach once explained his philosophy of "total effort". It is a philosophy he not only wanted his football team to believe in, but a philosophy he lived his life by. Simply put, the "total effort" philosophy means you give the game everything you've got -- within the rules! In the arena of athletics this means you must follow the prescribed rules, **INCLUDING** the non-use of steroids. In the arena of life you must also follow the prescribed rules. Athletics is supposed to teach us about the real game, and the game you see, is the game of life. Whether you finish first or last, if you give a "total effort," you will be the best that you can be. This truly makes you a winner.(20)

Chapter 2

THE ERGOGENIC EFFECT OF STEROIDS

There is little about androgenic-anabolic steroids that can be agreed upon by the medical community.(21) Even steroid users disagree on the expected strength and weight gains that can be made while using steroids. Presented in this chapter will be some of the legitimate uses of steroids, a few widely accepted statements about steroids, and what athletes and other non-medical users hope to gain from steroids.

A typical therapeutic dose of steroids ranges from 5 to 20 milligrams per day.(22) Even a dose of this proportion has limited use in the medical profession. The medical community is still not certain if a typical therapeutic dose will decrease or stop the natural production of testosterone.(23) They are certain, however, that even therapeutic doses cause adverse effects. The amounts some athletes are using will certainly decrease or stop the production of natural testosterone.

Some of the therapeutic uses of steroids include the treatment of severe burns, breast cancer, and anemia. After surgery steroids are used to promote healing, increase the appetite, improve the body's use of protein, and protect the blood-producing bone marrow after malignant tumors for those patients treated with radiation therapy. Anabolic steroids are used to treat skeletal disorders such as osteoporosis and to improve the cellular growth in patients suffering from starvation and malnutrition. Steroids also help to increase the muscle growth and strength in patients with abnormally low testosterone levels, while decreasing their percent of body fat.(24)

As stated previously, there is little about steroids that physicians and scientists can agree upon. However, there seems to be some general agreement on the following points. First, most knowledgeable people in the medical community seem to agree that the long-term use of anabolic steroids in large doses will result in abnormal liver function tests, suggesting some type of possible liver damage.(25) Second, scientific evidence seems to show no gains in muscle mass or strength through the use of steroids without a systematic, intensive weight training program and an adequate nutritional program.(26) Third, there seem to be somewhat unsubstantiated harmful effects from the long-term use of large doses of steroids. After several decades of athletes using steroids, this is what we can scientifically substantiate!

The question of whether anabolic steroids increase muscle mass and strength is not an easy one to answer. On one hand, scientists have no real proof the increases some people claim are due strictly to the use of steroids. The majority of scientific studies have used rather small doses of steroids.(27) These doses are not representative of what most athletes reportedly use.(28) On the other hand, we have cases where athletes have reported enormous increases in muscle mass and strength seemingly due to the use of steroids. Let us assume that both scientists and athletes are correct. Using the premise that small doses of steroids do not

cause increases in muscle mass and strength but that much larger doses do cause those increases, what are the positive changes athletes look for when using steroids? The remainder of this section will discuss many of those expected changes.

Anabolic steroids do tend to increase body mass and strength when used in mega-doses. Many athletes are using 20 - 100 times the recommended therapeutic doses.(29) One reason mega-doses seem to increase body mass and strength is due to the way the body utilizes protein and nitrogen.(30) The more protein that can be retained and utilized by the body the more of a positive nitrogen balance there will be in the body. A positive nitrogen balance will promote muscle growth and strength. Therefore, if a weight-lifter has a negative nitrogen balance, he or she will not be able to increase muscle mass or strength. The steroid user is able to change that negative nitrogen balance to a positive balance and continue to gain muscle mass and strength. This change in nitrogen balance seems to be why non-weight lifters who start taking steroids and start lifting weights at the same time do not have great increases in strength and size. They had a positive nitrogen balance to start out with and did not gain that advantage through the use of steroids. Even steroid users will eventually return to a normal nitrogen balance, and when this occurs, they often change types or brands of steroids to once again regain that positive nitrogen balance.(31) The increased assimilation (use) of protein by the body while taking steroids also explains why steroid users tend to be on high protein diets.(32) The retention of protein and a positive nitrogen balance may also cause the body to retain fluid, which causes some weight gain. All of this means that steroid users do get bigger and stronger more quickly than they would naturally, but they also set themselves up for some adverse effects.

Along with an increase in body mass, many steroid users report a decrease in body fat and an increase in lean muscle mass. These two effects seem to be caused by the increase in body weight. When steroid users have been tested for body fat, their amount of body fat tends to stay the same, even though their weight increases. This simply means that steroids do not cause the body to lose fat; rather, when most weight that is gained is muscle, there is less of a percent of total body fat. People tend to gain muscle, not fat, while on steroids.(33)

Another reported positive effect due to steroid use is an increase in speed. This is relatively easy to explain. Speed is developed, at least partially, because of an increase in strength in the lower body. As strength increases, speed also increases. Therefore, speed is really an associated effect of steroids and not a direct effect. One must also look at the type of muscle fibers that tend to increase during steroid use. The speed fibers, or type two muscle fibers, appear to gain much more bulk than the endurance, or type one muscle fibers, do.(34) This would mean that a sprinter who uses speed fibers would benefit more from steroid use than would a marathon runner, who uses endurance fibers.

Studies to date have not been able to provide documentation as to the consistent improvement in aerobic capacity due to steroid use.(35) Although the research is not conclusive, it appears that use of steroids will **not** significantly improve

cardiovascular fitness levels. The use of steroids does seem to help athletes recover faster from intense workouts. When a person can recover faster, he or she is then able to train harder and more often, increasing endurance. Therefore, increased endurance is also thought to be an associated effect of steroids, although not a direct effect.

The last positive effect seems to be the effect steroids have on the nervous system -- anabolic steroids seem to have a motivational effect on the brain.(36) This simply means that people who use steroids seem to be more motivated and aggressive in their workouts than do people not using steroids. Having increased motivation and aggression means they can, and do, train harder and longer when using steroids. Having the ability to train harder and longer during each training session, and being able to recover more quickly, would certainly seem to be interpreted as a positive effect of steroids.

Chapter 3

THE NEGATIVE EFFECTS OF STEROIDS

It is important to remember that every steroid is different and every steroid user is different.(37) The adverse effects that occur in one person may not occur in another. Those people thinking of using steroids should not fool themselves into thinking that no adverse effects will happen to them. To put it simply, you do not know what the adverse effects of steroids will be until they happen to you -- and they will happen if you use steroids!

Although not all can be scientifically substantiated, anabolic-androgenic steroids do have some terrible side effects.(38) The name itself implies negative effects. The word anabolic means to build and strengthen tissues, but the word androgenic means to produce or enhance male characteristics.(39) This may not sound like a negative effect to males, but the problem is that when we put androgens in our male body, our body itself stops producing the natural male hormones. The production of testosterone is lowered with the use of steroids. This causes a decrease in the size of the testicles and depression because there is an insufficient amount of male hormone reaching the brain. When women put androgens in their bodies they become more masculine and/or take on male characteristics.

Before discussing the adverse effects of the use of anabolic-androgenic steroids, we must take just a moment to discuss why scientific evidence concerning the effects of steroids is lacking. The reason for lack of sufficient evidence is two-fold.

First, funding for the research of steroids is lacking. No major athletic organization or governmental agency in the United States has provided money for researching the effects steroids may have on users who ingest or inject massive doses of the drug.(40) Research has been limited to the effects therapeutic doses may have, drug testing procedures, and patterns of use among different populations.(41)

Conducting valid and reliable studies regarding the massive doses of steroids is very difficult. It is certainly unethical to ask people to use 20 to 100 times the therapeutic dosage of a drug simply for the sake of researching the possible negative effects. Double blind studies, in which the participants in the study are supposed to be unaware if they are receiving the drug or not, have been unsuccessful. The reason for their lack of success is simply that it soon becomes apparent to both the participants and researchers who is taking steroids and who is not. Because of this research, problems researchers often resort to interviewing people already using steroids.(42) Although this procedure answers many questions, it is not completely a scientific approach. This approach does provide us with some possible negative effects from the use of steroids. The remainder of this chapter will discuss the possible adverse effects of anabolic-androgenic steroids.

POSSIBLE ADVERSE EFFECTS IN WOMEN ASSOCIATED WITH ANABOLIC STEROID USE:

PERMANENT deepening of the voice
PERMANENT growth of facial and chest hair
PERMANENT hair loss and male pattern baldness
PERMANENT scarring acne - especially on the shoulders, back, and chest
Menstrual irregularities and temporary sterility
Oily skin
Reduction in breast size
Increased risk of breast cancer
Fetal damage, if pregnant

POSSIBLE ADVERSE EFFECTS IN MALES ASSOCIATED WITH ANABOLIC STEROID USE:

Breast pain and **PERMANENT** breast enlargement
PERMANENT premature hair loss and male pattern baldness
Shrinking of the testicles
Lower sperm count and temporary sterility; over a period of years this may become **PERMANENT**
PERMANENT scarring acne -- especially on the shoulders, back, and chest
Possible birth defects
Pain when urinating
Prostate enlargement and possible cancer

POSSIBLE MENTAL AND/OR PSYCHOLOGICAL ADVERSE EFFECTS IN MEN AND WOMEN ASSOCIATED WITH ANABOLIC STEROID USE:

Increased irritability
Severe mood swings
Severe depression
Increased hostility and aggression
"Roid rages" (Uncontrollable incidents of violent/aggressive behavior)
Psychological addiction
Insomnia and restlessness
Paranoia and hallucinations
Criminal behavior
Suicidal tendencies
Increased frustration and anxiety
Strained relationships with family and friends

POSSIBLE ADVERSE EFFECTS TO THE CIRCULATORY SYSTEMS OF MEN AND WOMEN ASSOCIATED WITH ANABOLIC STEROID USE:

High heart rate
High blood pressure
High cholesterol levels
Damage to the heart muscle
Frequent nose bleeds
Blood clots
Hardening of the arteries
Swelling of the feet and lower legs

POSSIBLE ADVERSE EFFECTS TO THE REPRODUCTIVE SYSTEMS OF MEN AND WOMEN ASSOCIATED WITH ANABOLIC STEROID USE:

Menstrual irregularities and temporary sterility in women
Reduction in breast size in women
Increased risk of breast cancer in men and women
Damage to the fetus, if pregnant
Breast pain and PERMANENT breast enlargement in men
Deformed sperm in men, possibly leading to birth defects
Lower sperm count in men
Temporary sterility, with the risk of permanent sterility in men
With men, pain when urinating
Shrinking of the testicles in men
Prostate enlargement and possible cancer in men

POSSIBLE ADVERSE EFFECTS TO OTHER BODILY SYSTEMS OF MEN AND WOMEN ASSOCIATED WITH ANABOLIC STEROID USE:

PERMANENT deepening of the voice in women
PERMANENT growth of facial and chest hair in women
PERMANENT hair loss and male pattern baldness in men and women
Oily skin in women
Acne on the back, shoulders, and chest of men and women
Diarrhea
Fever and chills
Severe headaches
Liver damage, including cancer
Nausea and vomiting
Kidney damage and possible kidney stones
Weakened immune system
Abdominal pain and cramps
Dizziness

OTHER POSSIBLE ADVERSE EFFECTS IN MEN AND WOMEN ASSOCIATED WITH ANABOLIC STEROID USE:

Increased injury risk - especially fractures, ligament tears, muscle tears, and muscle tendon tears
Increased healing time for injuries that do occur
Increased muscle cramps
Early closure of the growth plates, leading to stunted growth
Continuing unpleasant breath odor
Possible infections (including AIDS) from injecting the drug
Arthritis and arthritic-like changes in the joints

POSSIBLE ADVERSE EFFECTS ASSOCIATED WITH THE WITHDRAWAL FROM ANABOLIC STEROIDS:

Severe depression
Feelings of inadequacy and weakness as the body size decreases
Suicidal tendencies
Fatigue and listlessness
Lack of interest in exercise or sports
Strong desire to go back to steroids
Some individuals can become **PSYCHOLOGICALLY DEPENDENT** onto steroids

SIGNS AND SYMPTOMS OF ANABOLIC STEROID USE:

"Puffy," swollen look to the face
Acne - especially on the shoulders, back, and chest
Excessive time spent working out
Frequent nosebleeds
Frequent muscle cramps
Increased aggression and violence
Increased irritability
Periods of depression
Quick strength and weight gains
Wide mood swings

NOTE: The symptoms mentioned may not be the result of anabolic steroid use in young athletes, but should serve as warning signs to be checked out by adults concerned about the welfare of these athletes. Again, it should always be remembered that every steroid is different and every steroid user is different. Therefore, the adverse effects that occur in one user may or may not occur in another user.

The negative effects of steroids can be summarized in two ways. First, some individuals can become psychologically dependent to steroids.(43) Many athletes insist they will stop taking these drugs at a certain point in time in order to lessen the

negative effects. Most do not! The psychological and physiological desire to return to the drugs is so great that most ex-users return to the use of steroids in a relatively short period of time after they have stopped taking them.

Second, steroids do not provide lasting gains in muscle mass or strength. At best they provide only temporary gains, and only while they are being taken. This simply means that a person may be able to increase muscle mass and strength while using steroids; but, when the usage stops, those increases will be lost, at least to some extent. When people understand the limitations of steroids and accept the fact that they are not a magic elixir, the alternative of an aggressive weight training program and proper diet becomes the only wise choice an athlete can make when trying to increase weight and strength.

Chapter 4

DRUG TESTING

Drug testing is an extremely important issue to discuss in regard to steroid use. There are many points that need to be addressed. The objectives, legal ramifications, and cost of financing the testing program are all issues that must be considered. Dick Stickle, the Executive Director of TARGET, which is the alcohol and other drug program for the National Federation of State High School Associations, has recently written an excellent article that addresses many of the issues pertaining to drug testing. This chapter is a reprint of that article.

Drug Testing: Pros and Cons

When athletics and drugs are mentioned in the same discussion, drug testing is invariably brought up. Drug testing is looked upon by many as the solution to drug problems. One-time tests are not effective except to provide the public with an appearance of concern. Within just the last three years, a number of schools have entered into drug testing without adequate discussion of the pros and cons, and as a result created a variety of problems for their school.

Drug testing is one of many controversial issues facing our schools today. Some drug testing proponents are offering "unique" suggestions in regard to drug testing. These suggestions need to be carefully considered. Utilize those that offer accurate and appropriate information and discard the rest.

For instance, a doctor suggested that high school athletic teams be tested and that the samplings received from each of the athletes all be put into one batch and a single test be conducted on the entire batch. If the test proved positive, then the team would forfeit its previous game. Had the good doctor thought through all of the ramifications of his idea or the procedures in conducting the business of interscholastic athletics, it may have proven not to be a practical solution.

One other interesting suggestion came from a state legislative assistant who was quoted in an interview that "the cost for the one-time test would be included in the \$10 fee athletes now pay for their physicals at the beginning of the season."

While the two suggestions may seem to be "off the wall," they were promoted by well-intentioned individuals. There are also some positive ideas out there, as well.

It is no surprise to many that testing is an issue that will cause controversy whether a school chooses to test or not to test. One piece of advice on the testing issue is that each individual district should not avoid addressing the issue. There is not a state activity or athletic association that has the funds available to conduct a state testing program. Schools need to weigh their options carefully before embarking on a testing program or before they disregard it.

If a school does not address the drug testing issue, the decision may be made for them.

While the present cost of such drug testing programs is prohibitive, one needs to discuss the issue at the school district level. There are some very successful testing programs in some school across the nation. In time, the cost for testing will decrease.

The National Federation is asked many times why it does not have a national drug-testing program. There are two basic reasons for the National Federation's present position:

(1) The National Federation is not a regulatory agency and does not mandate any eligibility standards (ie., age, transfer, etc.). It would not be consistent with the philosophy the National Federation has operated under for the past 70 years. The National Federation does not have the authority to impose such a program.

(2) The cost of such a program would exceed all available resources. For comparison sake, consider the National Collegiate Athletic Association (NCAA). The NCAA has approximately 800 schools within its jurisdiction. The National Federation serves approximately 19,000 high schools and 17,000 junior high schools. The NCAA has budgeted \$3.2 million for 1990-91 to fund its drug-testing program for athletes who compete in championships as well as the random testing of football players. Many of the individual NCAA schools have a drug-testing program with a budget that is not included in the \$3.2 million.

The following ten issues should be discussed by every school before any decision is made concerning whether to test or not to test:

(1) **Clearly define and delineate the purpose and objectives of their testing program.** What is the reason for doing it? It is important to note that testing is not the panacea that some people would lead you to believe. It has to be a part of a total education program. Testing is not a stand alone component. If testing is used for punitive reasons, it will increase the legal problems for the school.

If we eliminate an athlete on the first violation, not only are we eliminating the athlete, but we are eliminating our opportunity to educate that student. The problem has not been resolved, but rather the problem has been removed to someone else's jurisdiction -- the leaf blower approach to solving a problem.

Some volunteer testing programs that use their testing as an educational tool vs. a punitive hammer have been proven to be very successful.

(2) **Determine what drugs your school will be testing for.** Everyone understands that alcohol is a drug of choice by high school students, but will students be tested for alcohol? If not, why not?

(3) **Evaluate the legal issues and their ramifications.** The legal issues can be complex. Privacy is a concern. If one is going to be giving a saliva test, certainly that's less intrusive than a urine test; likewise, a urine test would be less intrusive than a blood test. Privacy is going to be a paramount issue that must be addressed. Unfortunately, at this time, there is not a U.S. Supreme Court decision in regard to the testing of high school students in the area of sport. Therefore, there are no defined parameters. The parameters may vary from one court to the next court.

(4) **Decide how to finance the testing program.** It is vital to look at the total

cost involved. If one is going to test for steroids, the reality is that quality lab availability is limited, and the cost for steroid testing is very high. There is a two-step procedure in testing for steroids. Screening, and if it proves positive, a confirmation follow-up. This could cost as much as \$100 for a negative test and \$200 for a positive test.

The whole issue of cost for testing is difficult to address in simplistic fashion. The difficulty is that development costs for a laboratory are in excess of \$3 million which must be recovered to justify the existence of the laboratory. Also, it requires approximately \$800 thousand to \$1 million to maintain a facility regardless of the testing volume since the necessary staff, equipment, and facility must exist to offer the service. Therefore, if a laboratory only analyzes 1,000 specimens per year, the would have to charge \$1,000 each in order to exist. Or, if testing 10,000 samples per year they would have to charge approximately \$100 each. The biggest continuing expense is staff salary. The biggest amount of cost of a confirmed positive test is the time spent by staff to perform the additional test and assemble the data. Once a facility is testing 10,000 specimens per year, the charge for the test may drop. In addition, the charge for a test may also decrease if the testing performed does not include all of the drugs banned by the NCAA or International Olympic Committee (IOC).

The test for steroids is labor-intensive and time-consuming. The expense goes beyond the actual test. Consider the cost of gathering sample and maintaining the test integrity. A chain of custody must be established, which will be an additional expense. Documenting the integrity of the test is vital. There are a number of hidden costs.

(5) **Determine which students are to be tested.** Are the plans to test all of the students? Only part of them? Are the plans only to test the athletic teams? And if so, why? One must be able to defend the decision. (6) **Determine a system to guarantee the authenticity of the testing program.** This refers back to the collection procedure, chain of custody, and lab. Use only a reliable lab.

(6) **Determine a system to guarantee the protection of privacy.** This is a key issue to consider for any testing program. Establish a policy as to what will be done if a student tests positive. Who will be notified? The list can be lengthy. The longer the list, the less the privacy.

(7) **Use caution.** Testing for some drugs may encourage students to move to another drug. Testing at times only modifies the use pattern.

(8) **The absence of evidence is not evidence of absence.** In other words, don't automatically rejoice if your team tests negative. A good example of this was in 1989 when the National Football League tested and found only 13 individuals who had used steroids. Does that mean that only 13 NFL football players use steroids? When the NCAA announced testing at bowl games, it discovered that only one percent of student-athletes tested positive. Does this mean that 99% of NCAA football players are drug free? Drug testing means different things to different people. Some people will say they are drug testing when they are really just screening. Some labs use a procedure called radioimmunoassay. This is the most common and least expensive "testing," which is more aptly described as screening. The purpose of an immunoassay is to identify samples not having detectable

amounts of drugs; samples which test positive by the immunoassay screening test must be analyzed by the confirmation procedure known as gas chromatography mass spectrometry (GC/MS).

(9) **In America everyone is innocent until proven guilty.** Some people believe drug testing implies guilt, and one can only prove their innocence by testing negative. Some drug-free athletes will fight drug testing on principle.

Drug testing generates "objective" data which, if the testing is performed correctly, identifies individuals who need additional directed effort to discontinue their drug use. Drug testing also allows for identifying drug-using individuals before the drug use becomes so prominent that there are obvious overt indicators of regular use.

Students surveyed in the annual survey conducted by Who's Who Among American High School Students found 64 percent feel all high schools students should be tested for drugs and 47 percent for alcohol.

If anything is gained from the discussion on drug testing it must be that every school district must discuss drug testing as part of their total education program. The aforementioned ten issues must be addressed individually because the issue may effect each school differently.(44)

Chapter 5

POSITIVE ALTERNATIVES TO STEROID USE

Many factors affect the development of strength, with or without the use of steroids. The four basic factors are heredity, diet, intensity of training, and psyche.(45) You cannot change your hereditary factors, but you do have control over the other factors affecting the development of strength.

NUTRITION

Proper nutrition and strength training technique are the primary factors when discussing controllable factors in strength development.

Proper nutrition combined with intensive weight training will result in an increase in muscle mass and strength comparable to the results achieved with the use of steroids.(46)

People concerned with increasing strength and size should know that the results produced using these techniques will be slower in coming than through the use of steroids, but they will also be longer lasting. In 1989 Mr. Olympia, Lee Haney, made the statement, "You will ultimately make your best bodybuilding gains if you avoid steroids usage and just concentrate on hard training and good nutrition." (47)

Athletes and non-athletes need the same basic nutrients and the same basic nutrition information. A proper diet is one that provides adequate calories and other nutrients (carbohydrates, proteins, fats, vitamins, minerals, and water) in the needed amounts. There is not one food or beverage that will supply all nutrients in the amounts needed to promote good health. Eating a variety of foods will ensure that all nutrients are being provided.

Water is the most important nutrient for an athlete. Our bodies are made up of approximately 70% water.(48) During exercise our muscles work extremely hard and create energy. A by-product of this energy is heat. To rid itself of this excess heat, the body circulates blood through the muscles, picks up the heat, and loses the heat by circulating to the top of the skin. The evaporation of sweat cools the blood, which is then circulated back to the muscles to cool them. As sweat evaporates, the body loses water, which must be replaced in order for you to perform at an optimum level.

Thirst is not an adequate indicator of how much water you need to replace. Drinking to quench your thirst will supply only about one-half to two-thirds of your fluid needs.(49) By the time you are thirsty your body has lost more water than you will be able to replace during a normal practice or game. This means you will become dehydrated at some point during the practice or game. A water loss of as little as two percent of your body weight will cause performance to suffer.(50) Two percent water loss for a one-hundred pound athlete is only two pounds! One expert believes that, for every two pounds of water loss an average athlete uses, performance drops by 15%!(51)

In order to prevent possible dehydration the International Center for Sports Nutrition recommends that athletes drink a **minimum** of eight 8-ounce glasses of water a day.(52) Athletes should drink more during hot, humid weather or periods of intense workouts. In addition to this it is recommended that athletes drink one cup of water approximately fifteen minutes prior to any activity; then drink one-half cup of water every 10 to twenty minutes during activity.(53)

Sports drinks such as Gatorade are usually not needed by athletes to replenish electrolytes lost through perspiration during conditioning. If these drinks are consumed, they should be diluted with water to lower their overall sugar content. Sugar causes a fluid to remain in the stomach rather than be released into the bloodstream, where it is needed to cool the body. Diluting a sugared beverage using a ratio of 1 part water to 1 part sports drink seems to lower the sugar content to an acceptable level.(54)

The use of salt tablets should be strictly prohibited unless prescribed by a physician.(55) Salt tablets remove fluid from your muscles, where you need it most, and draw it into your stomach. This may cause dehydration and stomach upset.

Vitamins and minerals are both essential to the proper functioning of the body. Both vitamins and minerals are needed only in micro amounts. Large doses of vitamins and minerals help only if a deficiency exists.(56) In athletics this may occur in those athletes on low calorie diets, such as wrestlers and gymnasts. Neither vitamins nor minerals will provide extra energy or act to enhance performance. Any person who eats a diet of foods comprised of the four food groups will not have any difficulty in getting a sufficient amount of vitamins and minerals. Add to this the fact that many foods are "fortified" with extra vitamins and minerals, and it becomes apparent that vitamin and mineral supplements are not needed among high school athletes. If athletes choose to use a single, daily multi-vitamin, it should be one that does not provide more than 100% - 150% of the recommended daily allowance for each nutrient.(57) High doses of vitamins and minerals can interfere with the normal metabolism of other nutrients and cause other adverse effects. With the exception of one-a-day vitamin and mineral supplements, a physician should be consulted before taking any supplement.(58)

Carbohydrates, fats, and proteins are the three energy nutrients for the body. All three can produce energy. Fat is a very concentrated form of energy and contains twice as much energy by weight as either carbohydrate or protein. Fat, however, takes approximately 20 - 30 minutes from the time an athlete starts an activity before it is used as a source of energy. During activities of moderately heavy work, fat provides the majority of energy, **providing the activity lasts for 90 minutes or more and is performed continuously!** An example of these types of activities would be a marathon or triathlon. High school athletes do **NOT** need to eat foods high in fats! Most people, high school athletes included, eat much more fat than is needed by the body for energy.

The body has the ability to store fat for later use, but storing too much fat is a detriment to athletic performance as well as to our health. It is recommended that a healthy diet contain no more than 30% fat.(59) A high fat diet is **NOT** necessary for athletes or non-athletes.

To help in evaluating the amount of fat in our diet let's review what high fat foods are and a simple way to count fat calories. Foods high in fat include whole milk and milk products, nuts, peanut butter, salad dressing, fried or greasy foods, chips, and sausages. Each gram of fat a food or beverage contains is equal to 9 calories. If a pork chop has 24 grams of fat that is equivalent to 306 calories.(60) If an athlete needs 4,000 calories a day to maintain weight, a maximum of 30%, or 1200 calories, should come from fat. The pork chop represents 1/4 of their total fat calories needed for the day. Charts in the appendix of this booklet will help you calculate fat calories for foods you may eat.

Carbohydrates are the most readily available and the primary source of energy in high school athletics. Carbohydrates in foods are turned into glucose through the digestive process. Glucose is a simple sugar that the body uses directly as energy. If the glucose in our bloodstream is not immediately used for energy, it is converted into glycogen and stored in the muscles and liver. All activities, especially high-intensity and short-duration events, call for the use of glucose or glycogen for energy. These activities include football, basketball, volleyball, and weight lifting.

Unfortunately, the body only has the ability to store approximately 1800 calories of glycogen.(61) This is a relatively small amount when compared to the 140,000 calories of fat the average person has stored!(62) When the body's energy stores are full, there is enough glycogen to last for about two hours of continuous high-intensity exercise. It is essential to good athletic performance that we take in adequate amounts of carbohydrates on a consistent basis to keep replenishing the glycogen stores.

On a daily level it is important to consume 55 -60% of our calories in the form of carbohydrates. Foods containing high amounts of carbohydrates are breads, cereals, pasta, low-fat milk and low-fat milk products, potatoes, fruits, vegetables, and sugars. Approximately 2/3 of these calories should come from the complex carbohydrate sources, which are those containing small amounts of sugar.(63)

Three advantages have been shown when consuming higher amounts of complex carbohydrates than simple carbohydrates.(64) First, the body is able to store more of the complex carbohydrates for later use. Thus being able to supply more energy on a regular basis. Second, complex carbohydrates do not go directly into the bloodstream, but are stored before they are used for energy. The advantage to this is that the body has a constant supply of energy rather than a supply that fluctuates up and down. Lastly, complex carbohydrates supply other nutrients the body needs. Most simple carbohydrates provide only calories. Carbohydrate calories in excess of what the body can store as glycogen are stored as fat.

If an athlete needs 4,000 calories a day to maintain weight, then at least 2200 calories should come from carbohydrates. This typically means eating a total of 10 - 16 servings of foods high in carbohydrates, and low in sugar, each day! Extra

carbohydrates must be consumed if an athlete is going to gain muscle weight. Charts in the appendix of this booklet will help you calculate carbohydrate calories for foods you may eat.

Liquid carbohydrate supplements are often touted as being an excellent way to consume carbohydrates needed to sustain energy levels for long periods of time and as an excellent choice for pre-game meals. These types of events would include a marathon or an all-day tournament. While it is true these supplements provide high levels of carbohydrate and are digested quickly, one should also remember that they may cause an increased need to urinate, may lead to stomach upset if consumed in large amounts, and may be a drastic change from the athlete's routine. Increasing carbohydrate intake prior to an event will not be of any benefit unless that event lasts **continuously** for 90 minutes or more.(65) "Continuously" means without any rest breaks. High school sports do not continuously last for this amount of time, so these drinks are usually not needed during the activity. A diet that is consistently high in carbohydrates should produce the desired results during competition.

Liquid carbohydrate supplements may be very helpful during an all-day tournament. The reason for this is that an athlete may choose not to eat due to the short amount of time allowed before competition will resume. Although consuming fruit juices low in sugar and eating complex carbohydrates are excellent foods to eat during these tournaments, liquid carbohydrate supplements are also acceptable.

The biggest misconception among people trying to gain muscle mass and strength is that they must consume large amounts of protein. Our muscles are made up of approximately 70% water and only 20-22% protein!(66) Fifteen percent of our daily caloric intake should be in the form of protein.(67) If we consume that much protein on a daily basis, we are providing our bodies with all the protein required to build muscle tissue.(68) It is **extra carbohydrate, not protein**, that must be consumed to give the energy needed to sustain long and intense workouts so that muscle strength and mass may be gained!(69)

Determining the proper amount of protein that should be eaten can be calculated in two different ways. First, if 15% of the total daily caloric intake should be consumed as protein, it is possible to determine the total daily caloric intake of protein. If an athlete is consuming 4,000 calories a day to maintain weight, he should be consuming a maximum of 600 calories a day of protein.

A more precise way to determine your specific protein requirement is to estimate that an average athlete needs 1/2 - 3/4 gram of protein for each pound of body weight. For athletes involved in intense weight training the figure of 3/4 gram of protein for each pound of weight should be used.(70) For a 180 pound athlete who is **NOT** involved in intense weight training, that calculates into 90 grams of protein for each day. For a 180 pound athlete who **IS** involved in intense weight lifting that calculates into approximately 135 grams of protein for each day.

The following foods contain approximately 10 grams of protein each: 1 ounce of lean meat, 1 egg, 1 cup of milk, 1 slice of cheese, 4 slices of bread, 1 cup of yogurt, 2 tablespoons of peanut butter, and 1/4 cup of nuts.(71) Charts in the appendix of this

booklet will further aid you in calculating protein calories for foods you may eat. Keep in mind that excess protein calories are stored as fat, not protein. Your body does not store large amounts of protein for later use. Protein must be taken in regularly in smaller amounts to be of benefit to the body.

As stated earlier, one of the biggest misconceptions about protein is that athletes, especially weight training athletes, must consume large amounts of this mineral in order to gain strength and weight. Many athletes turn to the use of protein supplements to enable them to consume what they believe is adequate protein to facilitate these strength and weight gains. Unless the protein being consumed is part of a one-a-day multiple supplement, it should not be used without first consulting a physician.(72)

There are several possible adverse side effects associated with the use of protein supplements that people should be aware of. One possible adverse effect is dehydration. Increasing the consumption of protein also increases the need to take in additional fluid. Without additional fluid intake, dehydration is a definite concern. Other possible adverse effects include kidney strain and damage due to excessive protein intake and metabolic imbalances. These imbalances can lead to calcium losses which can weaken bone tissue and cause serious injury.(73)

Food lists containing common food items, calories, grams of carbohydrates, protein, and fat can be helpful if one takes the time to use and understand them. For many people, however, the lists seem confusing. Charts in the appendix of this booklet are listed in a variety of ways to help you further understand carbohydrate, fat, and protein needs you have.

According to the National Dairy Council, Inc., on a daily basis, teenagers should consume 4 servings from the milk group, 2 servings from the meat group, 4 servings from the fruit-vegetable group, and 4 servings from the grain group.(74) These recommendations are set as minimums for the average teenage athlete. Athletes who follow this plan will receive all the nutrients they need for optimal performance. Athletes who want to gain muscle mass and strength may need to eat more calories than this plan offers, but most of those additional calories should come from the bread or fruit-vegetable groups.

Chapter 6

PRE-GAME MEALS

Pre-game meals can give athletes a definite edge during competition - not, however, the kind of edge many young athletes believe they will get. In high school athletics pre-game meals have two purposes -- to keep the athlete from becoming hungry during warm-up and competition, and to assure that the athlete is entering competition well hydrated! Pre-game meals do not give the athlete the energy needed for competition! The foods that have been consumed days and weeks before competition are the foods that give the athlete energy for the competition. Psychologically, a pre-game meal can give a competitor the edge needed to do well in a competition.(75) Physiologically, a pre-game meal either has no effect on the performance of a high school athlete or hinders that performance.(76)

Many sports nutritionists offer this "golden rule" to athletes regarding pre-game meals: eat familiar foods and drink plenty of fluids.(77) Although there are some definite guidelines on what to eat before competition, each individual athlete may vary in regard to what they tolerate well. Experience is the best guide. Do not experiment with new foods prior to competition. Eat foods and drink beverages you are used to.

The best foods to eat for a pre-game meal are those that will be digested quickly and will not irritate the digestive tract. Those foods contain mostly carbohydrates and come from the fruit-vegetable and grain food groups. This means that the ideal pre-game meal consists of foods such as pasta, breads, fruits, vegetables, pancakes, bagels, waffles, and similar foods. Individual athletes can choose which foods they prefer to eat.

Use moderation when eating high-protein foods like low-fat dairy products and lean meats. Avoid foods that contain high amounts of fat. High-fat foods are those such as sausages, peanut butter, any fried foods, and condiments. Foods containing high amounts of protein and fat take much longer to digest than do carbohydrates. During exercise, the flow of blood is drawn away from the stomach and diverted to the exercising muscles. This puts digestion on hold and can cause extreme indigestion and a feeling of fullness. In addition, both of these food types tend to raise the acidity level of the blood which can cause early fatigue.(78) Foods high in protein may also lead to increased fluid needs, because the body uses large amounts of water to excrete the waste products from protein.(79) This can lead to dehydration or the exaggerated need to urinate during competition.

Other foods to avoid at a pre-game meal are those that contain high amounts of salt, sugar, or fiber. Increasing salt intake always necessitates a need for greater water intake and increases the likelihood of dehydration. Foods high in sugar may temporarily increase the blood sugar level, but within a short period of time the body counteracts that and the blood sugar level drops to extremely low levels. This results in lower energy levels than would have resulted with no food intake

whatsoever. High-fiber foods can irritate the digestive tract and may stimulate the need for a bowel movement during competition.

An athlete should consume enough fluids during the pre-game meal to assure that he is well hydrated for the competition. The fluids should be low in sugar and low in caffeine. High sugar drinks, or foods, should be avoided, especially for pre-game meals. Drinking a fluid high in sugar will cause only a temporary rise in the blood sugar levels in the body. After 15 - 30 minutes of vigorous exercise the body raises the insulin level to counteract the blood sugar level and the amount of blood sugar available for energy is extremely low. A high sugar drink will also require the body to have additional water in the digestive tract to dilute the sugar. This takes water away from the muscles where it is needed in order to prevent dehydration and help ensure optimal performance. Therefore, sugar is **not** a good source of energy for the muscles.

Caffeine is to be avoided because it is a diuretic.(80) Whatever advantages caffeine may prove to have in elite endurance athletes, it does not have those same advantages in high school athletes, due to the nature of high school sports. High school sports call for stop-and-go action with frequent, short breaks in between bouts of activity. Also, high school sport activities require less than ninety minutes of continuous activity. Athletes involved in these stop-and-go activities over a relatively short period of time do not benefit from the use of caffeine. The results most high school athletes will notice with the use of caffeine will be increased nervousness, lack of concentration, increased need to urinate, and possible dehydration.(81)

A pre-game meal should include several glasses of fluid to help ensure hydration before competition. Your body does not absorb as much fluid once exercise begins, so drink plenty of fluids prior to competition. An athlete should drink 16 - 24 ounces of fluid at the pre-game meal, if possible.(82) Plain water may **NOT** be the best fluid to drink during pre-game meals. Considering the time of the pre-game meal a drink low in sugar may be better, as it is less likely to stimulate urination prior to the contest.(83) Charts in the appendix of this booklet will further address the fluid needs of athletes prior to competition.

A general rule of thumb is to eat your pre-game meal approximately 3 - 4 hours before the pre-game warm up will begin.(84) After the pre-game meal only water or fluids low in sugar should be consumed. It is important to remember that each athlete is different, reacting to the stress of the upcoming competition differently. Our digestive system reacts to this stress in one of two ways --it speeds up or it slows down. Using past experience as a guide, each athlete should time the pre-game meal so that it is appropriate for the individual.

The size of the pre-game meal certainly depends on the time it is eaten, the activity the athlete is participating in, the size of the athlete, and past experience. A good guideline to use is to eat approximately 300 - 500 calories for the pre-game meal.(85) This allows an athlete to have a moderate-sized meal, especially when most of the calories are coming from carbohydrates.

In summary, a pre-game meal does not give an athlete the energy needed for competition. It merely allows the athlete to compete without hunger pains and helps to ensure adequate hydration levels for competition. It is recommended that coaches, parents, and athletes consider the following general rules regarding pre-game meals: 1) eat familiar foods; 2) eat foods that contain mostly carbohydrates; 3) avoid foods high in sugar, caffeine, protein, and fat; 4) drink adequate amounts of fluids to be well hydrated; 5) eat approximately 3 - 4 hours before competition; and 6) do not eat a large meal. By following these general guidelines and those listed in the supplement to this update, athletes should be able to avoid problems sometimes associated with pre-game meals.

Chapter 7

TRAINING TECHNIQUE AND INTENSITY

As mentioned earlier in this booklet, increases in strength gains and muscle size can be accomplished without the use of steroids, other drugs, or supplements. The best results in strength gains and size increases come naturally because they last longer and have very few adverse effects, if done properly.

Strength training in athletics varies a great deal, depending on the sport one is training for. Football players desire more bulk than basketball players, and yet basketball players still want to increase their overall strength. Because there is no one program suitable for all sports, this chapter will deal with basic principles of strength training that are adaptable for all sports.

We must have an understanding of what strength training is, and what it is not. It is not body building, in which one tries to sculpt the body to look a certain way. It is not weight lifting, in which one tries to lift a maximum amount of weight. Strength training is a process by which one tries to increase strength in order to improve performance and reduce the risk of injury.(86) The techniques described in this chapter may not produce the biggest and strongest individuals; but, when used properly, they will help an athlete increase muscular size, increase muscular strength, increase muscular endurance, improve performance, and reduce the risk of injury in as safe a way as possible.

Prior to discussing the specifics of a strength training program it is imperative to discuss a few basic principles concerning the development of strength. The principles discussed here apply equally to male and female athletes. Contrary to popular opinion among some people, girls WILL NOT develop large bulky muscles as a result of a basic strength training program. Those world class women body builders who do develop large, bulky muscles are very unique in genetics, diet, and training program.(87) Girls will develop better muscle tone, muscular endurance, muscle strength, coordination, and will reduce the likelihood of osteoporosis as a result of strength training.(88) All of these are certainly desirable in athletics as well as everyday life.

First, one should know that any strength training program based on the overload principle will produce strength gains. The overload principle, or Principle of Progressive Resistance, stated simply is that, if you require the muscles to perform slightly more work than they normally do, they will respond positively and become stronger. As you progress through a strength training program, you must continue to increase the demands on the muscles so they are doing more than normal. In strength training this increase in workload can come from lifting heavier weights or doing more repetitions. A double progressive system of strength training, in which both repetitions and weight are increased at different times, seems to be the most beneficial in the high school athlete.(89)

Second, one should understand the **Specific Adaptation to Individual Demands (SAID)** principle. This principle states that athletes need to train the way they are going to play. You can't effectively train a runner on a bicycle or in a swimming pool. Although the use of a bicycle or swimming pool are excellent for injury rehabilitation and as an adjunct to a training program, in order to acquire the skills and conditioning levels required for athletics one must spend time participating in the actual sport. The same is true for strength

training. If you are strength training for speed and power, you should lift heavier weights for fewer repetitions than if you are training for endurance. Someone training for endurance would lift lighter weights for a greater number of repetitions. It is not recommended for either the strength or the endurance athlete to use a one-time maximum lift, especially a one-time maximum lift over the head.(90) This type of lifting is very dangerous and is not substantially beneficial in a strength training program. However, strength training must be performed differently for different sports because of the unique demands being placed on the body.

Lastly, strength can be increased by using either concentric or eccentric muscle contractions. Concentric contractions are those in which the muscle is shortened during the "lifting" phase of an exercise. Eccentric contractions are those in which the muscle is lengthened during the "lowering" phase of an exercise. Eccentric contractions will produce greater strength gains than concentric contractions, but may pose a greater threat of injury, especially to younger, less mature athletes. This is not to say that eccentric contraction exercises should not be used in high school strength training programs; but, as with all strength training programs, they must properly taught, supervised, and spotted for optimal safety.(91)

It is important to make at least a quick comparison between free weights and strength-training machines. As long as the overload principle is adhered to, either method will produce strength gains. Machines are sometimes thought to be safer and to promote good form and range of motion. Free weights, however, are a very effective method of strength training and, when used properly and with proper supervision, can be quite safe. The type of equipment used by most high schools is probably the type of equipment that is available in their facility. Any type of equipment will produce strength gains if the basic principles are adhered to.

The type of equipment varies widely from school to school and gym to gym. It is important to understand that increasing size and strength do not depend on the type of equipment used, but rather the intensity with which one trains. Free weights, Universal equipment, Nautilus equipment, and other strength training equipment will all be beneficial in increasing strength, if the program used is a sound one. The key differences between machine-weights and free-weights involve safety, range-of-motion, and lifting form.

Machine weights have built-in safety features that do not exist in free-weights. Prior to strength training with machine-weights or free-weights, a qualified instructor should instruct each participant in the proper use of the equipment. Because free-weights are not attached to a machine, the risk of injury is greater. Proper instruction, supervision, and spotting will dramatically reduce the risk of injury and are essential for a successful, safe free-weight strength training program.(92)

The use of machine-weights also encourages lifting through a complete range of motion. Due to the mechanical aspects of the machine it is less strenuous and safer to lift through the complete range-of-motion. This is especially true when completing over-the-head lifts. The advantage of lifting through the complete range of motion is that the muscles will be strengthened through the complete range. Free-weights can certainly be used through the

complete range-of-motion; but, again, proper instruction and supervision are key elements to a free-weight training program.(93)

The use of machine-weights promote good lifting form. Due to the mechanical aspects of the machine the body lifts the weights through a lifting pattern that is most beneficial to the muscles and least injurious to the body. Here again, free-weights can certainly be used with good form, but they require much more instruction and supervision than do machine-weights.(94)

The basic components of building strength have already been addressed. Now let's address the basic components of an effective strength training program. First, strength training must be emphasized year-round. Strength can be developed during the off-season, but it must be maintained during the season. If it is not maintained during the season, it will be lost by the end of the season. This loss of strength will increase the athletes, susceptibility to injury, decrease their performance potential, and lower the base at which they will start lifting during the off-season.(95) Ideally, athletes should be able to lift twice a week during the season. For best results allow 48 hours rest between a strength training workout and competition.(96) A more complete in-season strength training program will be discussed later in this chapter.

The ideal strength training program should incorporate four different types of programs or seasons.(97) The "post-season" is a period of active rest after the competitive season has been completed. It should last approximately 2 - 3 weeks and involve the athlete in physical activity that is enjoyable. This period it to allow the body to restore itself after a sometimes long and grueling season. Participation in physical activity should be accomplished 2 - 3 times per week for 30 -40 minutes per session.

The "off-season" begins after the "post-season" and lasts until approximately 4 - 6 weeks before the competitive season begins. The "off-season" is the time when strength, size, and power are developed. This period will involve the most intensive strength training. A model strength training program will be discussed later.

The "pre-season" is the period of time which begins approximately 4 -6 weeks before the competitive season and lasts until the competitive season begins. During this period strength training should definitely be continued, but increased sport-specific activities, increased cardiovascular activities, and exercises to improve flexibility should be added. A combination of strength, cardiovascular fitness, and flexibility will result in a high level of fitness which is needed for the competitive season.

The "in-season" is the period of time during which the athlete is involved in a competitive sport. It is often difficult to maintain strength during the season, and it is impossible to do without being involved in strength training during the season. Through the use of an "in-season" strength training program, approximately 90% of the strength gained during the off season can be maintained.(98) A model program for "in-season" strength training will be discussed later in this booklet.

For the high school athlete who is involved in more than one sport the ideal program does not seem to be appropriate time-wise. Athletes involved in more than one sport should attempt to take a week or two off after their competitive season is over before beginning

strength training. After this "post-season" period is over the athlete will probably need to combine the "off-season" and "pre-season" programs together. There often is not enough time to concentrate on just strength training for a month or two and then add cardiovascular fitness activities at a later date. Cardiovascular fitness activities and a strength training program will more than likely need to be incorporated together during the non-competitive season. This is entirely appropriate. It will allow for strength gains and maintained or increased cardiovascular fitness levels. It is extremely important for athletes competing in more than one sport to participate in an "in-season" strength training program.(99) Athletes involved in athletics year-around will likely notice that they will not only maintain but increase strength during a strength training program.

For strength training to be truly successful the athlete must adhere to the SAID principle, the overload principle, be properly instructed and supervised, be involved in a comprehensive program which also includes cardiovascular fitness and flexibility, and is preceded by warm-up and followed by cool-down.

Determining which strength training exercises or lifts to do and what muscles of the body to strengthen most are often among the most difficult decisions to make relative to strength training. The National Strength and Conditioning Association states that 65% of the strength, power, and speed needed in ALL sports comes from the muscles which are located from approximately the top of the chest to the knees.(100) The NSCA also recommends that 65% of all training time should involve the muscles of these areas. Exercises that strengthen these areas are called core exercises. The remaining 35% of training time should be concentrated on the neck, arms, lower legs, and shoulders.(101) Exercises that strengthen these areas are called supplemental exercises.

A MODEL PROGRAM FOR OFF-SEASON STRENGTH TRAINING

EXERCISE SELECTION

As stated earlier, 65% of the time spent strength training should be devoted to multiple-joint exercises which strengthen the area from the top of the chest to the knees and 35% of the exercise time should be spent on supplemental exercises. If core and supplemental exercises are being done on the same day, the core exercises should be performed first before the muscles have become exhausted. Emphasis should be placed on each major muscle group to ensure balanced muscle development.

Possible core exercises include: squats or hip sled, power cleans, sit-ups, bench press, incline press, hip flexors, and back arches.

Possible supplemental exercises include: military press, tricep extension, leg curls, leg extensions, bicep curls, upright row, dips, and shoulder raises.(104)

EXERCISE FREQUENCY

A regular training schedule is necessary for sustained strength improvement. If core exercises and supplemental exercises are performed on the same day, three non-

consecutive workouts per week seem to produce the best results. If core exercises and supplemental exercises are not going to be performed on the same day, a weekly split routine seems to work best. A weekly split routine would include doing chest, leg and stomach exercises on Monday and Thursday and doing back, shoulder, and arm exercises on Tuesday and Friday. The National Strength and Conditioning Association recommends 72 hours rest be allowed between strength training workouts for a particular body area. Less than 72 hours rest for a muscle group does not allow adequate rest for the muscle group to recover completely.(105)

EXERCISE DURATION/INTENSITY

Two theories exist in regard to the duration and intensity of strength training. One theory is that multiple sets of various repetitions will give the best strength gains; the other is that 1 - 2 sets of the same number of repetitions will give the best strength gains.(106) The reality is that both of these theories are probably correct, depending on the individual and the program. The following are two examples of strength training programs using each of the theories. Both will cause significant increases in strength. It is up to the individual athlete and coach to determine which program best fits the needs of the athletes. Time constraints, available equipment, and the overall purpose of the program must be taken into consideration when making this decision.

PROGRAM ONE - MULTIPLE SET THEORY

Set 1: 5 repetitions at the maximum weight that can be lifted 5 times.

Set 2: 6 - 8 repetitions at the maximum weight that can be lifted 6 - 8 times.

Set 3: 6 - 8 repetitions at the maximum weight that can be lifted 6 - 8 times.

Set 4: 10 - 12 repetitions at the maximum weight that can be lifted 10 - 12 times.

Set 5: 13 - 15 repetitions at the maximum weight that can be lifted 13 -15 times.

When the maximum number of repetitions is exceeded in each set, the weight being lifted in each set is increased.

The thought supporting this theory is that 3 - 5 sets of exercise per muscle group is optimal for building muscular strength, power, and endurance. Sets made up of a low number of repetitions build strength; sets made up of a medium number of repetitions build strength and power; and sets made up of a high number of repetitions build muscular endurance.(107) When doing a low number of repetitions with a near maximum weight it is imperative from a safety standpoint that there be proper instruction and supervision and adequate, trained spotters.

PROGRAM TWO - ONE AND TWO SET THEORY

Week one: complete 1 set of 10 repetitions at the maximum weight that can be lifted 10 times.

Week two: complete 1 set of 12 repetitions at the maximum weight that can be lifted 12 times.

Week three: complete 1 set of 15 repetitions at the maximum weight that can be lifted 15 times.

Week four: complete 2 sets, the first at 15 repetitions and the second at 10 repetitions - at the maximum weight that can be lifted 15 and 10 times, respectively.

Week five: complete 2 sets, the first at 15 repetitions and the second at 12 repetitions - at the maximum weight that can be lifted 15 and 12 times, respectively.

Week six: complete 2 sets of 15 repetitions at the maximum weight that can be lifted 15 times.

After week six the lifter begins over again with the same routine as in week one, but with a greater amount of weight.

The thought supporting this theory is that a double progressive system, in which both weight and repetitions are increased, will prevent or delay the onset of a plateau.(108) This program will also allow much less time in the weight room than program one and hopefully prevent boredom of the athlete.

EXERCISE SPEED

All strength training exercises should be performed in a slow, controlled manner to increase muscle force production and decrease potential for injury. Lifting the resistance should take 2 seconds, while lowering should take 4 seconds. There should be a momentary pause in the fully contracted and fully extended positions. This causes not only an excellent strength stimulus in the target muscle group, but also an excellent stretch in the opposing group. Slow, controlled strength training will greatly reduce the injury risk factor. Interestingly, the speed with which an athlete performs strength training exercises has little bearing on the speed with which he performs competitively.(109) What this means is that performing strength training exercises in a slow, controlled manner is appropriate for all sports, regardless of the speed required for that sport.

EXERCISE RANGE

For best results, each repetition should go through the full range of joint movement. Moving the joint through a full range of motion not only produces strength throughout the entire range of motion, but also helps to enhance flexibility. Moving a joint through a full range of motion means moving it from a completely extended position to a completely flexed position.(110)

EXERCISE PROGRESSION

Gradual increases in resistance are essential for developing strength. A program with emphasis on progressing slowly will result in greater muscle and tendon strength gains and less muscle soreness. When increasing the weight being lifted, it is best to increase by approximately 5%.(111)

EXERCISE CONTINUITY

The amount of rest between successive exercises depends greatly on the type of activity being trained for. Remember the SAID principle, which states that one should train the way they will play the game. In football, where longer rest periods are permitted between plays, longer rest periods can be permitted between successive exercises. In sports which require more endurance without frequent rests one should train allowing little rest between sets. As the competitive season draws closer, it is a good idea to reduce the rest period between sets to increase cardiovascular endurance. This certainly does not take the place of cardiovascular fitness training, but it is an important adjunct to it.(112)

Athletes often think of strength plateaus as physical limitations. Fortunately for those involved in strength training this is not true. Athletes will have to overcome many plateaus before reaching maximum strength. A plateau does indicate that some change in the training program must be made. These changes might include training frequency, amount of weight being used, exercise selection, or the incorporation of other activities.(102)

Most athletes who reach a plateau will choose to work harder in order to achieve greater strength. This will seldom work. Doing more of the same activity will usually cause one to maintain the plateau level or to lose strength. The following are alternatives which may produce better results. When reaching a plateau, an athlete should consider using one or more of these alternatives for a period of 4 - 8 weeks. When reaching a plateau, remember that when you have successfully worked through the plateau, you will be stronger.

- 1) Reduce the number of workouts per week. This will allow more recovery time between workouts and allow the muscles to repair and rebuild.
- 2) Change the number of sets and repetitions being used. Rather than lifting 3 sets of 5 repetitions, use 3 sets of 10 repetitions using a lighter weight. Rather than lifting 3 sets of 10 repetitions, use 2 sets of 15 repetitions using a lighter weight.
- 3) Select different exercises for the same muscle group. If you have a plateau in the bench press, change to the incline press, dumbbell press, or dips. Different exercises tend to put muscles through a different lifting pattern. The muscle group tends to gain in strength and the plateau can be worked through.
- 4) If no success has been realized with numbers 1 - 3, it may be necessary to eliminate that muscle group from the strengthening program and incorporate other fitness activities. Running, cycling, swimming, and rope jumping are all excellent fitness activities. Although they may not directly increase an athlete's strength they will improve cardiovascular fitness levels and allow the muscles to fully recover.(103)

A MODEL PROGRAM FOR IN-SEASON STRENGTH TRAINING

In-season strength training has as its primary purpose the maintenance of strength gained during the off-season. When planning in-season strength training programs, keep the following ideas in mind:

1) Concentrate on the core exercises that strengthen the muscles from the top of the chest to the knees. Possible core exercises include squats or hip sled, power cleans, sit-ups, bench press, incline press, hip flexors, and back arches. For football and wrestling include exercises for the neck.

2) Train once or twice a week, depending on time allotments and competitive schedule. If at all possible, don't train within 48 hours of competition.

3) Spend a maximum of 30 minutes in the weight room per training session. Twenty minutes per session is more ideal.

4) Do one set of exercises for whatever muscle groups you choose to exercise.

5) A set should consist of 8 - 13 repetitions at the maximum weight which can be lifted 8 - 13 times.

6) Remember to maintain muscular balance among muscle groups by exercising opposing groups.

7) Including strength training either before or after practice is totally acceptable. Develop a program that best fits your needs. Possibly some athletes can train before practice and others can train after practice. Allowing little time between sets can also make strength training part of a cardiovascular fitness program. Research from Dr. Wayne Westcott, National YMCA Fitness Director, indicates it may be wise to schedule hard training sessions for strength and endurance on the same day. If strength training and endurance training are both being performed on the same day, the order in which exercises will be performed will depend on the sport. If the sport has a greater strength component, the strength workout should come first. If the sport has a greater endurance component, the endurance workout should come first. If both components are of equal value, the endurance workout should come first.(113)

Strength training programs vary depending on the sport, the supervisor or coach, the equipment available, the time available, and the objectives of the program. The principles discussed in this chapter can be adapted to fit any desirable program and will result in a successful, safe strength training program. The individual results gained will vary, but they will include muscular strength gains, muscular endurance gains, and a reduced risk of injury.

Chapter 8

Effective Prevention Ideas

The information in this booklet is designed to help prevent the use of steroids. In order to best accomplish this goal we must keep several main points in mind as we develop a prevention program.

First, it is imperative in a prevention program to provide students with information about the positive effects sought from steroid use, possible negative effects steroid use can have on the body **and** positive alternatives to drug use.(114) Using scare tactics by just presenting the negative information concerning steroids is not effective. If educators do not inform students of what steroids are capable of, both negatively and positively, the students will find out elsewhere. We must allow students to make an informed decision about their personal use of steroids. When given the opportunity to see the entire picture in terms of steroid use most students will decide the benefits are not worth the risks. A two-sided approach, offering information about the positive aspects and the negative aspects, has been found to better prepare students for coping with influences to use drugs.(115)

Next, use a variety of strategies in the educational effort against steroids. Be sure that coaches and teachers have accurate information about steroids. Coaches should make a special attempt to put even more emphasis on the importance of the training program being used and the fact that steroids are not an acceptable part of that training program. Coaches, parents, and students need opportunities to not only evaluate information concerning the scientific facts about steroids, but also their individual attitudes about steroid use.

The steroid prevention effort should be part of a total program stressing the wellness of the students. We cannot ask students to "just say no." We must give them some positive alternatives to steroid use. By informing students of the possible harmful effects of steroids **and** giving them alternatives to drug use we have given them a choice. Most students, when they see the devastating effects steroids can have, will choose the alternatives of proper nutrition, proper training technique, and proper motivational techniques.

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