UNDERGROUND ANABOLICS draws readers deep inside the world of black market anabolic steroids. In collaboration with co-author Ronny Tober, William Llewellyn guides readers through two decades of steroid prohibition, with an emphasis on today's global market dominated by counterfeits and underground labs. Even before publication, this exposé of the world of underground steroids had already created enormous controversy. When word of this book spread, certain underground figures tried to bribe, threaten, and even personally attack Llewellyn to prevent him from publishing this information. It is the one book many underground labs absolutely don't want you to see!

You heard all the rumors and inaccurate information about underground steroids, but Llewellyn's book exposes the truth. For example, you will discover what steroid prohibition has actually accomplished, and the pitfalls of this unregulated and extremely volatile business. You will be an invited spectator to view the assembly area of a registered pharmaceutical company, as well as a full functioning underground steroid laboratory. See for yourself how underground steroids are actually made. Many helpful tips and pictures provide invaluable assistance in identifying products of high and low quality. This book is a MUST HAVE for healthcare workers, law enforcement officials, academic researchers, and anyone thinking about using black market anabolic agents!

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WILLIAM LLEWELLYN with RONNY TOBER

By the Author of the #1 Bestselling ANABOLICS Reference Guide

UNDERGROUND Anabolics



WILLIAM LLEWELLYN
with RONNY TOBER

WILLIAM LLEWELLYN'S

UNDERGROUND ANABOLICS

by William Llewellyn with Ronny Tober

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William Llewellyn and Ronny Tober

Table of Contents

I. Prohibition – Anticipating Results

Introduction 3
Drug Prohibition and the Drug Supply 4
Modern Examples of Drug Prohibition 5
Adulterants/Contaminants of Common Illicit Drugs 9

II. The Evolving Steroid Supply

A Black Market Before Prohibition 13
First Major Supply Restriction (1985) 14
Laboratories Milano de Mexico (1986) 14
Steroid Prohibition Begins (1988) 16
Federal Anabolic Steroid Control Act (1991) 16
European and Asian Imports (1992-1999) 17
First Thailand Interdiction (2000) 19
The Market Goes South (2003) 19
Mexican Market Takedown (2005) 22
The Market Goes Underground (2006) 22

III. The Illegal Steroid Business

Anabolic Steroids and Organized Crime 27
Principal Source Countries for Anabolic Steroids 30
An Evolving Consumer Market 35
The API Trade 39
Difficulties Circumventing the Steroid Trade 42
Steroid Usage Trends 44

IV. Pharmaceutical Steroid Manufacturing

Aseptic Processing 49
The Inside of Injectable Manufacturing 52
The Intricacies of Tablet Manufacturing 64

V. Underground Lab Busts

The Rise and Fall of British Dragon 69
The Paperbol Enterprise 75
Major Bust in Bulgaria 77
Spain – Operation Mammoth 81
Operation Raw Deal 83

VI. 3rd Party Lab Analysis Reports

Quality of Illegal Doping Substances in the Netherlands (2004) 89
Poison in a Package, USA (2005) 92
ANABOLICS Underground Market Analysis, Europe (2007) 94
German Market Study (2008) 100
UK Market Report (2009) 104

VII. Underground Steroid Manufacturing

Overview of Underground Laboratory Types 111
Inside an Underground Lab 113
Underground Tablet Manufacturing 119
Interview with an Underground Chemist 120
Understanding Filtration 124
Common Problems with Underground Products (Injectable) 126
Common Problems with Underground Products (Oral) 130
Added Health Risks of Underground Steroids 132
Visual Inspection of Products 137

VIII. Analysis of Black Market Steroids

Lab Testing for this Book 141
Overview of Labs Tested 142
Alpha Pharma 144
Asia Pharma 146
Axio Labs 148
Balkan Pharmaceuticals 151
Diamond Pharma 153
Dutch Lab 155
Elite Fitness Pharmaceuticals 157
Euro Pharmaceuticals 159

Eurochem Laboratories 161
Geneza Pharmaceuticals 163
Gen-shi 166
Golden Gear 168
IP China 170
Jinan 172
Lyka Labs 174
ProChem Laboratories 176
Quality Vet (counterfeit) 178
R.O.H.M. 180
Sciroxx 182
Stealth Labs 184
Unigen Life Sciences 186
Testing Comments 188

IX. Conclusion (Evaluating Steroid Prohibition) 193

Endnotes 197

Prohibition - Anticipating Results

Introduction

Prohibition is a socio-legal concept that seeks to limit the supply and consumption of potentially harmful substances by individuals, ostensibly for the sake of the public good. It is generally applied in the form of laws, which may place civil (monetary) or even criminal penalties on the illegal trade or possession of banned or strictly regulated substances. These laws have traditionally been directed at the use of recreational drugs such as opiates/heroin, cocaine, amphetamines, hallucinogens, cannabis, and alcohol. Prohibition laws have rarely eliminated the supply of, or demand for, these drugs. Rather, they have tended to alter the way these drugs are traded and used, often substantially. In recent years, prohibition policies have been expanded in a number of Western countries to include anabolic steroids. This book seeks to examine the brief history of steroid prohibition, with special emphasis on the effect this prohibition has had on the supply of anabolic steroids to remaining illicit consumers.

Drug Prohibition and the Drug Supply

Drug prohibition laws have existed in the United States for more than 130 years. In an idealistic sense, prohibition laws are designed to prevent individuals from accessing dangerous substances, and hence protect them from the perils of drug abuse. These laws are all written and passed with a mindset of protecting society. A realistic assessment of more than a century of drug prohibition, however, paints a picture that falls far short of this ideal. Indeed, no law has ever succeeded in eliminating the demand, availability, or use of any recreational drug. Instead, these laws have succeeded only in altering these variables. If prohibitive laws are to be judged on their true merits, we need to look past the ideal of drug elimination. We need to examine the actual environment of drug use that these laws create.

The influence of prohibition laws on drug demand can be variable, and difficult to foresee. It may also be largely influenced by the way society views the safety of the substance. The effect of prohibition on the drug supply, however, is considerably more predictable. If we examine modern historical examples of substance prohibition, we find that these laws have all drastically changed the way in which banned substances were manufactured and distributed to remaining (law-defying) consumers. Most generally, substance prohibition creates an alternative unregulated (black) market. The stronger the drug demand and more limited the drug supply, the more lucrative this black market may be. This is the fundamental problem with prohibition. As laws and law enforcement become more effective at limiting the supply, the more lucrative the market becomes for potential new sellers.

An unregulated black market means a number of things for the drug supply. To begin with, drugs sold on the black market are usually manufactured illegally, often in makeshift labs. Rarely do clandestine laboratories make their products to pharmaceutical standards, and there can be significant issues with purity or safety. This means a great deal of uncertainty for the drug-buying consumer. An illicit drug may also be traded through many criminal hands before it reaches the end consumer. This can mean a great deal of "cutting" and adulteration (mixing of the drug with other substances), and potential risk to the consumer. Prohibition laws also make transporting and trading a drug in its most concentrated (and therefore concealable) form most lucrative. This instability and uncertainty in drug quality can increase the risk of injury and overdose death with some substances.

Lastly and perhaps most fundamentally, prohibition laws provide a financial incentive to engage in crime. Instead of the money for these drugs being infused into legitimate, regulated, and taxed businesses, it is diverted to organized criminal manufacturing and distribution networks. This is a place with no set rules and no government protection. Drug manufacturers operate in a world where grievances are often resolved with violence, not attorneys. This is one of the most basic sociological problems with drug prohibition laws. Although the laws are meant to protect society, they can support criminal activities and significantly harm society at the same time. The true value in any drug prohibition law is, likewise, found in the balance between reduced drug abuse and increased crime (all forms of related crime).

Modern Examples of Drug Prohibition

Over the past 100 years there have been many examples of drug prohibition laws. A majority of these laws date back many decades, and have provided sociologists ample time to study their effects. If we are to understand the potential long-term impact of anabolic steroid prohibition, we need to examine several other modern examples of prohibition. The following section will discuss the prohibition of some of the most identifiable recreational drugs including cocaine, heroin, and marijuana, and even the failed federal ban on alcohol. Special emphasis will be placed in all cases on how these prohibition laws changed the drug supply and risks to consumers.

Alcohol Prohibition



In 1919 the U.S. government passed the Volstead Act, which amended the Constitution to include the prohibition of alcohol. The demand for alcohol was not eliminated with this law, nor was the supply. They were, however, drastically shifted. Much of the supply under the ban came from international criminal organizations, which were formed to smuggle alcohol from other nations at high profit. High potency (hard) alcohol came to be more widely consumed under Prohibition, due to its smaller size and higher profitability for smugglers. Alcohol that wasn't smuggled was made domestically, in illegal underground distilleries. During Prohibition there were no alcohol regulations to enforce beyond a complete ban. These distilleries all operated without any government regulation or oversight, and were often very crude.

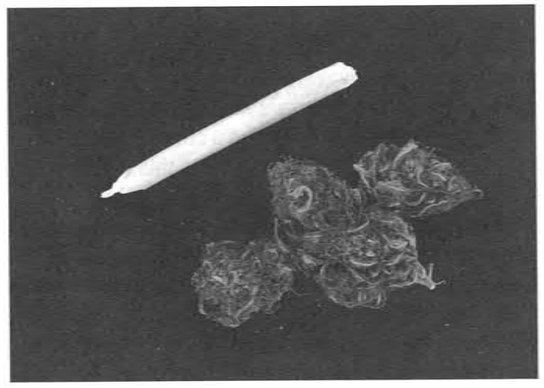
One very serious and persistent problem during prohibition was the adulteration of alcoholic beverages, especially with methanol (wood alcohol).[2] This industrial alcohol is used mainly as a solvent, although it has intoxicating properties similar to common ethanol (normal beverage alcohol). Methanol is moderately toxic, however, and can cause severe nerve damage including paralysis and blindness, and even death.[2] Methanol is considered a chemical, and is not for human consumption. In spite of this, bootleggers would widely use methanol to thin legitimate booze and increase profits. Some very unscrupulous criminals would even directly flavor industrial methanol/ethanol mixtures and pass them off as gin or other spirits. The exact number of serious methanol poisoning cases that occurred during the prohibition era may never be known, but by some estimates exceeds 50,000.[3]

The Volstead Act was ultimately not successful in protecting society from the dangers of alcohol abuse. In fact, by most accounts the banning of such a popular drug turned out to be quite disastrous. Instead of ending the use of alcohol, the constitutional amendment is credited with creating an illicit and unregulated alcohol black market, fostering corruption, and inciting organized criminal activity. It allowed many illicit fortunes to be made in the illegal trade of alcohol, and created many career criminals. Some of the Prohibition Era crime organizations have criminal offshoots that survive today, trading in other illicit commodities. Alcohol prohibition was repealed in 1933, less than 14 years after going into effect. Today,

this era is viewed as one marked by a flawed and failed social experiment. The minimal benefit of Prohibition on reducing alcohol consumption (if any) was far outweighed by its negative effects on society.

Marijuana Prohibition

Marijuana has been designated a federally prohibited substance in the United States since 1937. Most Western nations also have long-established similar prohibitive laws towards the substance. In spite of over 70 years of active law enforcement efforts, however, a black market thrives to the tune of tens of billions of



dollars per year in the United States alone. Increasing pressure on marijuana smugglers over the years has succeeded only in diverting the supply to locally grown marijuana. Domestic marijuana is often carefully cultivated indoors or in small outdoor gardens, and tends to be of higher potency due to the exclusions of male plants (seedless marijuana produces more THC). According to estimates, the most prolific county in Northern California (Mendocino) produces approximately $1 billion dollars worth of high-grade marijuana every year.[4] Marijuana eradication efforts have clearly failed, and the flowering buds of this plant are presently a key cash crop for many areas of the country and world.

Among illicit drugs, marijuana is one of the least commonly adulterated, likely because it is difficult to contaminate without notice. Still, adulterated marijuana is occasionally a problem. For example, between 2006 and 2007 England reported that as much as 10% of the confiscated cannabis samples in some areas were contaminated with tiny glass beads.[5] Dealers had been spraying their marijuana buds with a commercial glass frosting spray, making the buds heavier and more "crystallized" in appearance. To the uneducated buyer this can look like a normal high quality (highly resinous) product. In reality, this low quality contaminated marijuana can be very dangerous, subjecting the user to small silica particle inhalation. This type of marijuana (known locally as "grit weed") has been linked to sore throat, mouth ulcers, and respiratory distress and damage. It could even lead to a potentially fatal lung disease called silicosis.

In April 2008, reports surfaced in nearby Leipzig, Germany of a series of lead poisoning cases among marijuana smokers.[6] Over a period of a few months, 29 people had come to local hospitals complaining of similar symptoms including stomach cramps, nausea, and fatigue. These cases were quickly attributed to lead poisoning, and soon connected to a common source, adulterated marijuana. Samples of the drug were located, and shown to contain as much as 10% lead by weight. Authorities quickly set up a screening program for local marijuana smokers. Perhaps most alarming is the fact that out of the 145 Leipzig residents that showed up for screening, 95 (65%) were shown to have some level of lead poisoning. Authorities estimate that this lead danger was placed on smokers so that dealers could net an additional $600-700 per pound.

Examples like these remind us of the incentive and ability for criminal dealers to contaminate their products under prohibition, even a difficult to adulterate substance like marijuana. The question then becomes, is this risk of prohibition traded for any real benefit? Marijuana is a drug arguably far less harmful than alcohol or tobacco. Does its prohibition actually help society? After more than 70 years of marijuana prohibition in place, the United States is a nation with approximately 10 million regular marijuana smokers. The laws seem to have had little effect on usage rates. In fact, there is much argument that the ban on marijuana smoking may actually increase its rate of usage, via a "forbidden fruit" effect.

The Netherlands is a nation that has essentially legalized marijuana use among adults, and rates of consumption are significantly lower in all age groups compared to the U.S. Instead of large expenditures on criminalization, the retail sales of marijuana generate tax income for the Dutch. Today, many in the U.S. are wondering if a similar system of regulation and taxation would be a better alternative to prohibition. In conflict with federal law, 13 U.S. states have already decriminalized the possession of small amounts of the drug by adults. Similar conflict between U.S. state and federal laws had occurred before the repeal of alcohol prohibition. Additionally, many other nations in Western Europe have removed criminal penalties for the use of cannabis by adults, including Austria, Belgium, Germany, Luxemburg, Portugal, Spain, and Switzerland.



Amnesia Coffeeshop, Amsterdam, The Netherlands

Heroin and Cocaine Prohibition



Heroin and cocaine have both been under strict prohibition laws for many decades. Arguably, U.S. law enforcement has focused most seriously on these drugs over the years. To this effect the government spends billions of dollars every year on domestic and international drug interdiction and eradication efforts. The Drug Enforcement Administration maintains offices around the world, funneling money and manpower into the local governments of key cultivating countries, in an effort to suppress drug manufacturing. In spite of all of this money and effort, highly lucrative black markets and criminal cartels continue providing these drugs to American users. Looking forward, the international supply of heroin and cocaine are expected to remain strong. Nations who are able to grow opium poppies or coca leaves simply find the financial incentive to grow them too great.

The quality of the market for these drugs under prohibition is very poor. Cocaine and heroin (in their traditional forms) are traded as powders, making it impossible to determine purity upon visual inspection. This provides ample incentive to "cut" the drugs with other substances, something that can create many problems. To begin with, there are often very large differences in the amount of drug between samples. For example, one study in Vienna, Austria found that while the median purity of street heroin was 6.5%, some samples we found to be 47% pure.[7] This can mean more than a 7-fold difference between one dose and the next. In the United States, the purity of

heroin tends to range from 10% to 70%, again about a 7-fold difference.[8] Even higher concentrations are occasionally found. Cocaine purity also ranges greatly, usually between 25% and 90%.[9] As drugs with the potential for death through an overdose, this can be very dangerous.

What constitutes the remaining bulk of street cocaine and heroin can also be extremely concerning. Dealers will often adulterate their costly narcotics with other substances that possess mimicking properties. For example, anesthetics are commonly used to cut cocaine because they also numb the nasal passages. A stimulant or fast acting opiate may be added to heroin to increase the rush. Frequently, however, very serious mistakes are made in the cutting and re-cutting of these drugs. This sometimes results in clusters of serious injuries and deaths among users. Many of these injuries and deaths could be avoided, of course, under a regulated market. In spite of this fact, however, most people remain in support of government prohibition with these drugs, out of fear that legalization would promote greater use.

Drawing a Parallel

When we review modern historical examples of drug prohibition, we always find that there has been a tradeoff with this tactic. In all cases, prohibition laws shifted, but did not eliminate, the drug supply. An unregulated black market is created, and fueled with drugs of clandestine manufacture and uncertain purity. This creates additional safety dangers for users, and finances corruption and criminal activity. These changes may (or may not) be outweighed by the societal benefit of reduced drug consumption. In the case of alcohol prohibition, the laws were ultimately more costly to society than a regulated market. Marijuana prohibition too appears to be on the verge of being deemed a failed social experiment. Of our examples, only heroin and cocaine prohibition appear to maintain popular public support. These examples are important as we evaluate the value of anabolic steroid prohibition: Will there actually be benefits with this tactic, or will it also be too costly for society?

Adulterants/Contaminants of Common Illicit Drugs (non-inclusive list):

Marijuana

Pesticides
Cocaine
PCP
Glass particles
Lead

Cocaine

Industrial solvents[10]	(residue)
Novocaine[11]	(anesthetic)
Benzocaine	(anesthetic)
Lidocaine[12]	(anesthetic)
Caffeine	(stimulant)
Atropine[13]	(anticholinergic)
Hydroxyzine	(antihistamine)
Methylephedrine	(stimulant)
Diltiazem[14]	(calcium channel blocker)

Heroin

Industrial solvents	(residue)
Acetaminophen	(analgesic)
Phenobarbital	(depressant)
Caffeine[15]	(stimulant)
Procaine	(anesthetic)
Methaqualone[16]	(sedative)
Morphine	(opiate)
Heavy metals[17]	(residue)
Diazepam	(depressant)
Fentanyl	(opioid)
Clenbuterol[18]	(stimulant)
Strychnine[19]	(poison)
Arsenic[20]	(poison)
Xylazine[21]	(sedative)
Noscapine[22]	(cough suppressant)
Scopolamine[23]	(anticholinergic)

The History of Steroid Prohibition

The Evolving Steroid Supply

A Black Market Before Prohibition – 1960s thru early 1980s

The regular use of anabolic steroids for nonmedical (performance-enhancing) purposes began in the early 1960s. The very first users were typically athletes who had received a prescription from a team physician, although very soon after athletes themselves found ways to begin buying and selling the drugs. With a staggering ability to promote increases in muscle mass and strength, the landscape of competition in strength and speed sports changed very quickly. By the mid-1960s, anabolic steroids had spread throughout many sports in the U.S., although their use was most frequently associated with competitive athletics, football, and bodybuilding. Diversion of the drugs from legitimate channels had become commonplace, and a national black market was thriving, mainly distributing the pharmaceuticals in gyms and athletic training facilities.

Anabolic steroids had been classified as prescription drugs essentially from their time of inception. Since 1938 it has been a violation of the Federal Food, Drug, and Cosmetic Act to distribute prescription drugs outside of a legitimate doctor-patient relationship (21 U.S.C. 353(b)(1)(B). A prescription is required to reflect this relationship. Drug diversion, or sale without a valid medical prescription, is a misdemeanor crime under this law. The penalties for violating these requirements of the Food, Drug, and Cosmetic Act have traditionally been very light, usually involving probation and small fines ranging from $500-1000.[24] Without laws making the illicit steroid trade a felony practice, significant prison terms would not be given. As could be expected, this combination of high financial incentive and low perceived risk proved far too tempting for many people inside the pharmaceutical industry.

The primary (almost exclusive) source for anabolic steroids on the black market in the United States during the 1960s and 1970s was the diversion of domestic pharmaceuticals products. Without a detailed accounting of each drug's chain of custody, which is required for all controlled substances, it would be easy for manufacturers and wholesalers to shift steroid inventories to unlicensed buyers without notice. And this did go on, unnoticed, for a very long time. The first criminal case involving steroids would not be filed until 1984, and a dedicated investigation team not put into place until 1985. At this point, the steroid black market had been ignored by law enforcement for nearly 25 years. As a market that was driven by real pharmaceuticals, the industry for generic pharmaceutical steroids predictably ballooned in the U.S. during these early decades. Whether knowingly or not, most if not all of the companies making anabolic steroids were profiting extensively from their diversion to the black market at some point in the supply chain.

An interview with former steroid dealer we will identify only as "Jerry" illustrates how loose the legitimate supply chain was for steroids even during the early 1980s. Jerry operated in Long Island, New York between 1981 and 1985, and sold mostly in bulk to local gym dealers. Jerry's most active source for steroids was a generic pharmaceutical manufacturer (identity withheld) in the New York Tri-State area. The company made some of his most popular items including testosterone cypionate, testosterone propionate, and nandrolone decanoate. In the literal meaning of the phrase "out the back door," Jerry would meet his contact, a key principle of the company, on the loading dock after hours. This went on for years, with Jerry paying in cash and filling the trunk of his car with steroids each visit. This relationship ended when Jerry retired from the business for health reasons, and was never discovered by authorities.

First Major Supply Restriction – 1985

In December 1985, the Food and Drug Administration took its first major step to shore up the out of control domestic steroid market. That year it sent a letter to U.S. drug manufacturers demanding that they stop selling certain generic anabolic steroid products that no longer had recognized medical applications. Among other compounds, this marked the end of the sale of methandrostenolone tablets in the United States. Two years earlier, Ciba Pharmaceuticals voluntarily discontinued the sale of the brand name drug (Dianabol) after FDA pressure to substantiate its medical uses. Dianabol was the original drug that started the anabolic steroid craze. Because it is both extremely effective and very easy to use, it had remained one of the most popular and sought after anabolic steroid products among bodybuilders and athletes. The abrupt removal of one of the most popular steroids in history presented a big problem for domestic dealers.



U.S. generic methandrostenolone from Bolar, removed from market in 1985 with all remaining generics.

The supply restrictions of 1985 marked a turning point in the illicit steroid trade. While the early 1980s had noticed product importation and counterfeiting, this had accounted for a minority of the products traded on the black market. With methandrostenolone removed from legitimate domestic commerce, there was no local source for product diversion. The importation and counterfeiting of methandrostenolone was dramatically ramped up out of sheer necessity. With methandrostenolone being surreptitiously manufactured on a regular basis, the financial incentive was there to counterfeit other drugs as well. Often the underground products were turning out to be significantly less expensive than their pharmaceutical counterparts. From this point onward, domestic anabolic steroids diverted from legitimate pharmaceutical companies no longer made up the majority of the products available on the black market. The era of steroid smuggling and counterfeiting had begun.

Laboratories Milano de Mexico - 1986

In 1986, Mexican company Laboratories Milano de Mexico, S.A. de C.V. became the center of an international counterfeiting and smuggling operation that would come to epitomize the new era of steroid counterfeiting. Milano was a legitimate pharmaceutical manufacturer in Tijuana, Mexico. They were known for producing low cost generic drugs for the local market, and had legally been in operation since 1982. The market for drugs was competitive in Mexico, however, and margins were tight (reportedly around 10-15% for most products). The company would not see tremendous financial success until it deviated from its normal business model in 1986. That year, the company struck a deal to manufacture Dianabol for a group of U.S. steroid dealers. This illegal contract would change the future of not only Laboratories Milano, but also the entire U.S. black market for steroids.

The Laboratories Milano operation began making methandrostenolone for the group of dealers in the spring of 1986. The drug was put under a counterfeit label, which listed its manufacturer as Ludwig Heun in West Germany. This was done both to take advantage of the good reputation of European pharmaceuticals with American athletes, particularly a similar counterfeit that had already been circulating, and to hide the connection to Mexico from authorities. This

was important as the drug had to be smuggled over the border, and authorities had little experience with steroids at the time. The first shipment was a success. Approximately $30,000 worth of methandrostenolone was delivered to the U.S. distributors, later identified as *Underground Steroid Handbook* coauthor Dan Duchaine and associates David Jenkins (the organizer of the group) and William Dillon. The trio quickly reordered.

Laboratories Milano was very soon in the steroid business full swing. The lab, which began its steroid enterprise with only methandrostenolone, was soon making 14 anabolic steroid products. Their most popular sellers included methandrostenolone, testosterone cypionate, nandrolone decanoate, stanozolol, oxandrolone, oxymetholone, and boldenone undecylenate. The operation copied the products of a variety of legitimate drug manufacturers, including such companies as Lemmon, Searle, Squibb, and Ciba-Geigy. They went to great lengths to produce accurate copies, in one case investing $10,000 in a custom-made pill dye that duplicated Searle's Anavar tablet to near perfection. The counterfeit Anavar looked so good that it was making its way into legitimate U.S. pharmacies. Searle changed its own packaging shortly after, which some believe was done to differentiate from the fake.

The steroids that Milano produced were typically smuggled over by the group with the help of drug mules. Tablets, which were very small, were transported loosely in bulk, and were counted and assembled into bottles once safely inside the United States. The drugs were often hidden under loose clothes, and carried over on foot in the high traffic border between Tijuana and San Ysidro, California. The group had even devised a set of pants that could conceal a large bulk of tablets at the bottom of the legs.[25] At other times they were placed in a secret compartment inside the gas tank of an automobile. For as long as customs agents at the border were unaware of the high volume steroid manufacturing in Mexico, these fairly crude methods of drug smuggling seemed to work, at least consistently enough to be viable. The business and customer base grew rapidly.

The Laboratories Milano steroid smuggling operation was exposed in the spring of 1987, only about one year after the counterfeiting began. U.S. federal courts had unsealed a 110-count indictment, naming the lab and 34 individuals allegedly involved in the illegal business, including original co-conspirators and organizers David Jenkins, Dan Duchaine, and William Dillon. Federal authorities estimated that between 1986 and 1987, the San Diego-based group did between $2 and $4 million dollars worth of business with Milano.[26] At least for the trio, this lucrative business was over. Although steroids were not yet controlled substances, the defendants were still given a variety of very serious federal felony charges including defrauding the United States, holding counterfeit drugs for sale, introducing misbranded drugs into interstate commerce, and tax fraud. The potential penalty for each of the organizers was 16 years in federal prison. Less than one year of incarceration was actually served by the key defendants, however.

Residing in Mexico, the Milano operation was not immediately affected by the U.S. indictments. The local industry of border town pharmacies catering to American tourists grew along with the Milano operation for two more years. Extradition was especially unlikely in this case, given that steroids were not controlled drugs in Mexico, and lab owner Juan Macklis generally left the smuggling up to the buyers. Instead of lying low, he continued to boldly promote his business. Macklis even flouted U.S. law during a televised interview with *20/20*. U.S. district attorney Phil Halpern, who had prosecuted Macklis's U.S. coconspirators, would go on to state that:

> *"Between 1987 and 1989, Laboratories Milano has been the largest single distributor of steroids in the U.S. marketplace and perhaps in the world."*[27]



This counterfeit methandrostenolone was originally made by Laboratories Milano in Mexico in 1986. It was labeled to be a West German product.

The lab was finally raided and closed in April of 1989, after the Mexican authorities became disgusted with his flagrant television appearance.[28]

Steroid Prohibition Begins - 1988

In 1988, U.S. law enforcement would be given a new weapon in their fight against the steroid black market. It would come in the form of a law, the first specifically targeting anabolic steroids. Dubbed the Anti-Drug Abuse Act of 1988, the amendments to the Food, Drug, and Cosmetic Act made it a federal felony to distribute anabolic steroids unless it was done pursuant to the order of a physician to treat a medical disease. Selling steroids illegally was now punishable by up to three years in prison, a term that was doubled if the crime involved sale to a minor. The amendments also allowed the government to seek the forfeiture of property from steroid dealers that had been arrested and convicted of felony distribution crimes. While the possession of anabolic steroids for personal use was not yet a crime in the United States, the government could now target steroid distributors with greater vigor.

By FDA estimates, only about one third of the drugs circulating the U.S. black market in 1988 were legitimate pharmaceuticals of domestic origin. Approximately one third were smuggled in from other countries, principally Mexico, and another third were made domestically in clandestine counterfeiting operations.[29] Following several years of FDA scrutiny and law enforcement action, the market was significantly changing. In spring of 1989, the largest single source for illicit steroids closed down in Mexico, and domestic efforts were beginning to pay dividends. By the end of 1989, more than seven clandestine manufacturing locations had been closed down, and more than $16 million worth of performance-enhancing drugs had been seized.[30] While the black market was still thriving, U.S. authorities had made clear that there would be consequences for breaking the law.

Federal Anabolic Steroid Control Act - 1991

In 1988 the federal government arguably had the tools necessary to prosecute steroid distributors. Those convicted of the crime were now penalized as if they had violated the Controlled Substances Act, a law that regulates many narcotic pain medications, sedatives, tranquilizers, and even "street" drugs like marijuana, cocaine, and heroin. But there were many people in the government that were still not satisfied with this response. While the 1988 laws provided CSA-level penalties for steroid distribution crimes, they did not actually add the drugs to the list of federally controlled substances. As such, they did not put a mechanism in place to closely monitor the domestic pharmaceutical market for steroids. Product diversions remained commonplace. In the wake of a media blitz of anti-steroid stories between 1988 and 1990, politicians were once again able to intensify steroid laws.

In 1990, Congress passed the Anabolic Steroid Control Act. Signed into effect by President Bush, this law would finally add anabolic steroids to the U.S. Controlled Substances Act. The drugs were specifically placed on the Schedule III list, which put them in the same legal category as barbiturates, LSD precursors, and certain narcotic painkillers such as Vicodin and Lortab. This law increased the potential penalty for distributing steroids to up to five years imprisonment for a first time offense. This penalty was doubled for second and later offenses. For the first time, the illegal possession of an anabolic steroid was also made a federal crime. Individuals that did not have a valid prescription for the drugs could now face up to one year in prison simply for possessing them.



U.S. Steroids such as these were still popular before the Anabolic Steroid Control Act of 1990. They were effectively removed from market almost immediately after this law was put into effect in 1991.

The regulatory requirements that came with the scheduling of anabolic steroids as controlled substances likely had a much stronger impact on the black market supply of these drugs than the increased penalties. The Controlled Substances Act mandates that all pharmaceuticals under its purview be followed by a detailed paper trail from the time of manufacture to the point of patient distribution. All companies handling controlled substances must be licensed to do so, and permits are required for all imports and exports. Limits are set on prescription quantities, and all drugs must be stored in secured areas prior to being dispensed. Detailed records must be kept at all levels of the supply chain, and reports supplied to the FDA on a regular basis. These steps are meant to deter and uncover diversion at all levels.

The Controlled Substances regulations are generally very effective at preventing bulk supply-side product diversions. Licensing and documentation requirements make it far too difficult for manufacturers to produce excess inventory for illicit sale, and the inventories and records of licensed drug wholesales are kept under close scrutiny. Any significant misappropriation in the supply chain should be noticed. Post-dispensing diversions also remain low with anabolic steroids; this is likely due to the restrictions on prescription sizes and refills, and the limited size of the therapeutic market overall. The DEA would correctly claim years later that the 1990 legislation had, at least in part, "virtually eliminated domestic sources of illicit steroid use." While small quantities of domestic pharmaceuticals will always continue to be diverted for back market sale, it is estimated by this author (William Llewellyn) that this has accounted for significantly less than 5% of the domestic black market in all of the years following the Anabolic Steroid Control Act of 1990.

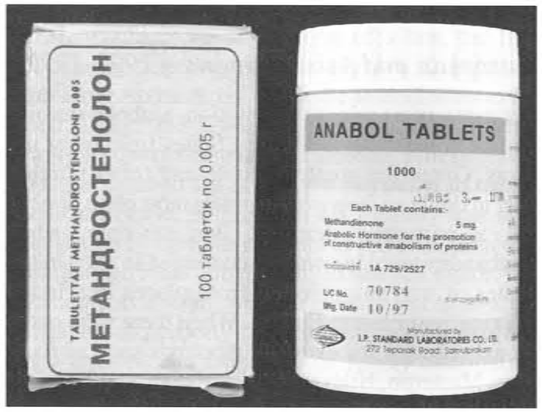
European and Asian Imports – 1992-1999

For many years prior to prohibition, anabolic steroids had been reaching the United States from other nations. Given the greater trouble and (often) higher cost in doing so, however, this was most often done to fill a particular demand. For example, when methandrostenolone was discontinued in the United States, it was smuggled in from places like India, Mexico, and Eastern Europe. When there were occasional requests for exotic compounds such as Esiclene, Masteron, Nilevar, and Parabolan, some dealers would import them from Europe. But international products were not the bulk of the market. After the Anabolic Steroid Control Act of 1990, however, this would change. Within a year nearly all of the steroids sold on the U.S. black market were either counterfeit, or smuggled in from other countries.



A collection of Spanish and Greek steroids popular during the early 1990s.

It would take many years before American politicians would succeed in spreading the idea of criminalizing steroid use to other countries, even in a limited sense. As a result, many nations could be used as source countries for U.S. dealers in the wake of the 1991 U.S. law. Initially, sizable quantities were coming in from Western Europe, and the products most notably



Russian D-Bol and Thai Anabol, two popular methandrostenolone products during the mid to late 1990s.

originated in Spain, Portugal, and Greece. These countries still had many areas where anabolic steroids could be purchased without a prescription, and the wholesale trade in these drugs was also not subject to much scrutiny at the time. Steroids from these countries were also readily available throughout Europe, and would also be shipped to U.S. dealers from countries such as England, Switzerland, and France, which were not under high scrutiny for narcotic smuggling.

Eastern Europe and Asia also had little restriction on drug sales, as well as low prices. The steroid trade would quickly seek out suppliers in this area of the world. During the mid-1990s, many products found on the U.S. black market were also of Indian, Russian, and Eastern European origin. Thailand also became a very strong source country by the late 1990s, and was arguably the world leader in methandrostenolone sales at the time. By the end of the century, it was clear that the U.S. was not succeeding in eliminating the steroid supply. It was only shifting it from legitimate domestic product diversions, to counterfeits and preparations originating in countries where the drugs were still readily available.

First Thailand Interdiction – 2000

After more than a decade of prohibition, the market

for anabolic steroids in the United States seems to have only grown substantially. Drug enforcement was undoubtedly getting frustrated, especially with the seemingly endless imports of Thai methandrostenolone. During the late 1990s, Thai steroids had become highly popular in the United States. The new millennium would mark a change in policy attempting to address foreign sourcing. The Drug Enforcement Administration would begin working with authorities in other countries to reduce the shipment of steroids and other controlled drugs to the United States, just as it had been doing for many years with the cultivation of marijuana, opium, and coca plants. On March 21, 2000, the DEA announced the results of a six-month joint investigation with Thai authorities into the Internet sales of controlled drugs to the U.S. including numerous anabolic steroids, Valium, fen-phen, codeine, Xanax, and Rohypnol.

The joint operation resulted in the raid of two pharmaceutical warehouses, one in Bangkok and another in Chiang Mai, some 700 kilometers to the north of Thailand. Both buildings were reportedly connected to Vitality Heath Products, a registered Thai distribution company at the center of the investigation. Thailand generally allows the dispensing of drugs from pharmacies without prescription, but it is a violation of law to export these same medicines without a license, something Vitality did not have. At least 22 individuals were arrested in Thailand as a result of the raids, and faced potential penalties of up to five years in jail and heavy fines. A small number of American consumers also faced charges for ordering controlled drugs from Vitality Health's websites.

The Thai raids in 1999-2000 had repercussions beyond the individuals directly involved. It seemed to change the nature of Thailand as a source country for steroids, at least partly. In the years after, U.S. Customs appeared to become much more vigilant at intercepting steroids from this country. Whether this was simply the subject of greater awareness among agents, or an increased overall customs focus on Thai steroids, remains unknown. What is clear is that with higher seizure rates, many Thai pharmacies and dealers stopped sending drugs directly to the United States. Thailand remains a strong source country for anabolic steroids in present day, however, but less direct to consumer business is done with the U.S., and the majority of its exports are likely to Europe. The U.S. black market would once again see a substantial shift in its supply chain.

The Market Goes South – 2003

A small veterinary drug manufacturing industry exists in Mexico, which had produced a small number of anabolic steroid products for years. But these products were generally in low demand with consumers to the north. If you were to ask a group of American steroid users in 1990 about Mexican veterinary steroids, they would probably speak about these drugs poorly. The bodybuilding/athletic community in the United States was accustomed to high quality U.S. pharmaceuticals. Mexican veterinary steroids were imported, but people usually (and admittedly without merit) regarded them as underdosed and/or dirty. As a result, they fetched lower prices than Amerian and European steroids, and were not smuggled into the U.S. in high volume. This, however, began changing in the era of steroid prohibition. With steroids under U.S. federal controlled substance laws, these drugs began to be smuggled over from Mexico in increasing volumes.

Mexico had already been an active hub for smuggling illegal drugs into the U.S. for many years. It was an ideal nation for a strong anabolics trade once U.S. domestic supplies were shut off. At first, however, Mexico had a limited legitimate market for steroids, and needed time to grow. The products in most demand were the few human items sold in pharmacies such as Sten, Sustanon 250, Primoteston, Deca-Durabolin, and Primobolan. A limited number of veterinary items were also available. But as the business of smuggling grew, so too did the domestic supply, specifically in the more flexible veterinary sector. Companies that

had been doing fairly negligible business with steroids before were soon making significant money with their manufacture, and often expanding their lines. New veterinary companies opened specifically to sell anabolic steroids. With all the money rushing over from the United States, steroids were becoming a hot business in Mexico near the turn of the millennium.

The Mexican market changed drastically over a decade and a half. This nation, which once had a fairly limited steroid supply, became the world's center of steroid manufacturing by 2002. By this point in time, Mexican veterinary manufacturers were outputting more individual steroid items and brands than any nation had ever distributed before it. DEA statistics for 2003 reported that an overwhelming majority

Examples of Bodybuilder-Focused "Vet" Formulas During Mexico's Peak Production



Stanazolic 100 (Denkall):

Contains 100 mg/mL of stanozolol, twice the concentration of a traditional veterinary formula. This was the first product to contain this much stanozolol per mL.



Stanol "V" (Ttokkyo):

Contains 10 mg of stanozolol per tablet, 5 times the dosage of a normal prescription tablet for humans.



Oximetalon (Denkall):

Contains 75 mg of oxymetholone per tablet, 50% more than a traditional prescription product.



Trenbo 75 (Animal Power):

Contains 75 mg/ml of trenbolone acetate, a powerful veterinary steroid not normally available in a form that is fit for human consumption.



Test 400 (Denkall):

Contains a blend of testosterone ester totaling 400 mg/mL, twice the maximum concentration of testosterone available in the U.S.



Nandrolona 300 (Ttokkyo):

Contains 300 mg/mL of nandrolone decanoate, a 50% higher concentration than the maximum dose of a traditional prescription formula.



Denkadiol (methylandrstenediol):

A steroid discontinued in the U.S. during the 1980s for failing to have a recognized medical use.



Methan Tabs (Animal Power):

Contains 10 mg of methandrostenolone per tablet, twice the dosage of former prescription versions.



Boldenone 200 (SYD Group):

Contains the veterinary steroid boldenone undecylenate in a 200 mg/mL concentration. This is 4 times the concentration of any preparation available before.

(82%) of all steroids seized by law enforcement in the U.S. were of Mexican origin.[21] Many of these products were also clearly deviating from those of traditional veterinary therapy. They would often carry high doses, human-focused compounds, and even multi-drug blends, which all seemed to appeal much more to bodybuilders than veterinarians. With the business so blatant, and the market so close, it would only be a matter of time before U.S. authorities stepped in, as they had years earlier with Milano.

Mexican Market Takedown – 2005

In December of 2005, the U.S. DEA announced the results of a 21-month investigation into the Mexican supply of steroids to the United States. Dubbed Operation Gear Grinder, U.S. authorities had indicted the owners and operators of eight of the largest Mexican veterinary steroid producers, specifically Brovel, Quality Vet, Denkall, Tornel, Pet's Pharma, SYD Group, Loeffler, and Animal Power. These companies were all legitimately registered in Mexico, and manufactured their products under the authority and (albeit loose) oversight of the Mexican government. However, these companies also saw a strong demand for steroids with the U.S. bodybuilding market, and capitalized on it. In fact, judging by the evidence, at least some of these companies may have been directly involved with the smuggling of their products to the United States.

The owner of the three most popular laboratories, Quality Vet, Denkall, and Animal Power, was Dr. Alberto Saltiel Cohen. Cohen had been residing in the United States at the time the indictments were handed down, and was quickly taken into custody. He was charged under U.S. law for conspiracy to import anabolic steroids, conspiracy to distribute anabolic steroids, and conspiracy to launder money. Authorities estimate that Cohen's operations accounted for 75% of the Mexican steroid market, bringing in approximately 40 million dollars per year. Most of the 23 people indicted were Mexican citizens, and could not be extradited to the U.S. Cohen ultimately accepted a plea bargain from prosecutors, pleading guilty to one count each of conspiracy to distribute controlled substances and aiding and abetting international monetary transactions. He would have to forfeit $1.4 million dollars in currency to the U.S. government, a small fraction of his yearly business. Cohen also agreed to cooperate with Mexican authorities and help control the Mexican veterinary steroid market.

Operation Gear Grinder was very effective at changing the manufacturing industry for veterinary anabolic steroids in Mexico. The most notable effect was that it eliminated the manufacture of most steroids from legitimate (registered) veterinary companies. Many labs immediately closed, including SYD Group (Mexico), Quality Vet, Denkall, and Animal Power. Ttokkyo, also a large producer, had already been closed down a few years earlier for ketamine and steroid smuggling. The few veterinary producers that remained at the end of 2005 either discontinued their steroid products, or eliminated those deemed appealing to human customers. Only a handful of registered anabolic steroid products remain on the Mexican veterinary market today. That is not to say that Mexico is a market with limited steroid supply. To the contrary, within a couple of years the Mexican veterinary steroid supply has been at least partly replaced by drugs from underground labs. This shift to an underground-dominated market mirrored the next major shift in the U.S. supply of steroids.

The Market Goes Underground - 2006

Although anabolic steroids became controlled substances in 1991, it seemed to take many years before federal authorities devoted serious resources to steroid investigations. There were occasional attention-gathering arrests, but a general feeling remained that steroids were not narcotics, and were not taken as seriously by the government. Starting at the turn of the century, however, law enforcement began visibly

cracking down on the international steroid trade. Over the course of several large busts, they had succeeded in substantially shifting the steroid supply more than once. In addition, customs agents had become very familiar with steroids and their popular source countries. It was getting harder and harder to import finished dosage units of these drugs. By 2006, the market was ready for another major shift in the supply chain — it went underground, literally.

With law enforcement more active than ever, and steroids under increasing scrutiny throughout the Western world, the steroid trade finally started to follow a basic rule of international drug smuggling: it is most profitable to smuggle the drug in its most concentrated form. In the case of anabolic steroids, a very small amount of actual drug (typically 500-2,000 milligrams) is supplied in each pharmaceutical container.



The difference between a Counterfeit Steroid and an Underground Steroid. The counterfeit (left) was made on the underground and labeled to be a vial of Australian Drive (a real pharmaceutical). Buyers are supposed to think it is from a real company. The product on the right is from a known underground lab (Diamond). Buyers are generally aware this is an underground lab, not a registered pharmaceutical company.

This creates an enormous amount of bulk. Instead of smuggling finished products, a dealer can import the raw powders in small 1 kg pouches and convert them into finished units after safely clearing customs. The difference in this practice can be enormous. For example, a single kilogram of powder can manufacture 2,000 bottles of methandrostenolone. A few small pouches can produce half a million dollars or more worth of steroids.

Underground steroid manufacturing labs had already existed for decades. Counterfeit steroids, for example, are manufactured on the underground. But by 2006, the term underground steroid began to take on a new and very specific meaning. It started referring to the product of a known underground lab. When dealers import their raw powders, they really only have a couple of options available to them. One is to copy the packaging of a legitimate steroid product (counterfeiting). This is a deceptive but generally effective practice. The other is to create a unique laboratory name for the product, which consumers could recognize as "underground." With the underground lab concept becoming increasingly accepted by consumers, more and more dealers have been choosing to do the latter. By 2006 to 2007, the U.S. market was flooded with thousands of underground products. Since this time, counterfeit drugs and products from underground laboratories have accounted for a strong majority of steroids sold on the U.S. black market.

The Illegal Steroid Business

Anabolic Steroids and Organized Crime

As history has shown us, prohibition laws can provide strong financial incentive to engage in criminal activity. The prohibition of alcohol, for example, provided untold millions of dollars in untaxed revenue to dealers, smugglers, and clandestine manufacturers of alcoholic beverages alike. During the 1920s, this high demand market with an abruptly eliminated supply created the most fertile breeding ground for organized crime in modern history, and criminal groups prospered throughout the United States. Along with these illicit fortunes came violence, often necessary to protect lucrative sources of illegal income. Today, few fail to associate alcohol prohibition with infamous (and often lethal) crime figures such as Al Capone, Bugs Moran, and Johnny Torrio. The associated violence and property crime had an impact on virtually all Americans, and likely hastened the end of federal alcohol prohibition (the ultimate cost deemed too great).

Illicit drugs such as cocaine, opium/heroin, and marijuana/hashish have historically also been extremely lucrative sources of income for organized crime. Many decades of active law enforcement have done little to abate these markets. According to 2008 United Nations statistics, these three drug classes provide more than $260 billion dollars per year in illegal revenue around the world.[32] The U.S. black market supplies of cocaine, marijuana, and heroin are presently dominated by Mexican and Colombian drug cartels, groups who often possess a willingness to protect their businesses with extreme violence. Over the past 10 years, in fact, Mexico has endured potentially destabilizing violence due to the drug trade. Rival cartels have been fighting each other, as well as law enforcement, over control of common smuggling routes, resulting in thousands of murders each year. In 2008 alone there were 5,612 murders in Mexico linked to the ongoing drug war.[33]

In the days before active law enforcement, anabolic steroids were not drugs of great interest to organized crime. Instead, they were most often illegally traded amongst networks of otherwise non-criminal bodybuilders and athletes. When U.S. District Attorney Phil Halpern was interviewed about the Laboratories Milano case, he made a similar observation. He characterized the American co-conspirators as "nice guys", explaining that they were bodybuilders, former athletes, and self-educated steroid experts, whose motives were to make a profit while helping athletes. Halpern further explained, "The irony is that successfully prosecuting the so-called amateurs, like Mr. Jenkins and Mr. Duchaine, has opened the door to a more sinister criminal element – cocaine and heroin dealers… These new people are only in it for the buck. They don't give a damn about anything else." Mr. Halpern's words, unfortunately, proved to be extremely prophetic.

It would not take long to see that Halpern was correct. Evidence that a more serious criminal element was investing in the steroid trade was discovered at the very operation he had been trying to prosecute. When Mexican authorities finally shut down Laboratories Milano during a series of raids and arrests in 1989, they took lab owner Juan Macklis into custody. He proved to be an extremely cooperative defendant. Macklis detailed how the operation had grown substantially from its original group of loosely organized athletes / smugglers, ultimately manufacturing many tens of millions of dollars worth of anabolic steroids destined for the U.S. black market. Macklis's most shocking confession, however, was that his expansion was funded in part by none other than Panamanian leader General Manuel Antonio Noriega.

General Noriega was deeply involved with the drug trade throughout most of the 1980s. He had worked very closely with the Medellin cartel, helping the or-

ganization transport billions of dollars worth of cocaine north toward the United States. He was also allegedly involved with many other criminal enterprises, including electronics, computers, and arms smuggling. Macklis explained how Noriega was also in the illegal steroid business, investing $800,000 in Laboratories Milano between 1987 and 1988. As evidence of this, Mexican officials confirmed that they had confiscated many boxes of steroids labeled "Colon Panama" during their raids. Authorities further commented that analysis revealed that many of these drugs were fake or adulterated, issues that would become commonplace under prohibition. Noriega was never charged with counterfeiting or trafficking steroids, but was convicted in U.S. federal court of cocaine trafficking, money laundering, and racketeering in April 1992.

Manuel Noriega would not be the last organized crime figure to get involved in the trafficking of anabolic steroids. In a 108-page report published in February 2007 and commissioned by the World Anti-Doping Agency, anti-doping expert Alessandro



Stephen Ferry/Getty Images News/Getty Images

Manuel Noriega. Allegedly Noriega was a partner in Laboratories Milano, a counterfeit steroid manufacturing ring that operated in Tijuana, Mexico between 1986 and 1989.

Donati details how the illegal trade for anabolic steroids has become increasingly controlled by a variety of organized crime groups. As Donati explains, the lax enforcement of pharmaceutical laws in many regions of the world has helped fuel the involvement of diverse criminal groups. Criminal organizations operating in areas such as Mexico, Eastern Europe, and Asia have been able to easily obtain steroids from local markets, making supply of little issue. This puts them in an advantageous position to exploit the high demand market for doping drugs, especially if they are already involved in the smuggling of other drugs to the United States or Western Europe.

According to Donati, Russian Organized Crime (ROC) has been especially active in the steroid trade since prohibition has gone into effect in the United States. The ROC designation does not refer to one specific group, but a loosely affiliated collection of crime families that originate in Russia and several other former Soviet Bloc countries. Beginning in the early 1990s and extending through present day, ROC has been one of the highest money generating groups involved in the steroid trade. This position has been based largely on the strength of the Eastern European drug supply. A robust pharmaceutical market exists in this region, distributing a wide variety of high quality medications. These drugs, however, tend to be sold at a small fraction of the cost of their Western counterparts. This has not only provided ROC an open source of steroids to smuggle, but also the ability to sell these drugs at extremely low prices. In many instances they have been able to both out-supply and under price competitive sources.

Although no official comprehensive examination of the illegal steroid trade has been published yet, many individual reports continue to surface suggesting organized crime has remained heavily involved since the turn of the century, likely growing its interests. For example, in 1999 DEA announced the arrest of 15 members of a Russian organized crime group that had smuggled more than 4,000 pounds worth of steroids into the United States. In 2001, John D. Glover, former FBI agent serving as director of corporate security for the BristolMeyers Squibb Company, confirmed publicly for the first time that

Mexican organized-crime elements (drug cartels) were involved in the illegal anabolic steroid supply coming from our South. And as recently as March 2009, FBI officials announced the arrest of 26 individuals working with ROC that were illegally smuggling in ecstasy, cocaine, heroin, marijuana, steroids, untaxed cigarettes, and counterfeit sneakers. This last story illustrates a growing trend where steroids are found in combination with other illicit commodities, often hard narcotics.

Drug prohibition has predictable outcomes, and anabolic steroids are no exception to this. As we have seen in the past with alcohol, marijuana, cocaine, and heroin, the era of steroid prohibition has brought fourth great financial incentive to trade in these drugs, and strong interest by numerous criminal organizations. Already trading in illicit narcotics, many of these groups previously had the mechanisms in place to smuggle anabolic steroids, and have done so very effectively. Given what we have seen of the illicit steroid market thus far, it seems highly likely that as we continue to exert greater levels of law enforcement pressure on those trading in these substances, the more aggressive and organized of the crime groups will continue to take greater control. If history has provided any lessons, we should expect to see increased violence as these more aggressive smugglers and dealers clash over market share.

Principal Source Countries for Anabolic Steroids



World atlas of steroid manufacturing. The most active source countries are shaded. Drugs originate in less controlled markets of Asia, the Middle East, and former Soviet Bloc countries, and are smuggled to restricted markets in the United States, Canada, and Western Europe.

This section examines the supply chain for anabolic steroids, specifically those products that are ultimately sold on Western black markets. The most active geographic regions supplying the United States are listed in this section first, and a rough determination has been made as to the ongoing state of the trade (in decline, stable, or increasing in prominence). Under each region are the most active source countries in that area, which are also listed in order of market share, largest to smallest. Note that in Western Europe, which is the second largest consumer market of illicit anabolic steroids, the supply trends will vary slightly. For example, supply from the Americas tends to be more limited in Western Europe, while drugs from Asia, the Middle East, and former Soviet Bloc countries maintain a larger percentage of the market share.

Region: East Asia

China

China is the leading supplier of raw steroid materials. Pressure that had been exerted on the market before and during the 2008 Summer Olympics seems to have largely abated. While most raw steroid materials manufacturers will refuse to do business directly with unlicensed companies as a result of past pressure, business remains easily facilitated by a collection of "middlemen" suppliers. Additionally, China has a growing and robust supply of finished anabolic steroid products. Most often these are made without a license, however, and are sold for export sale only.

Status: China is once again on the rise as a source country for steroid raw materials, and is also on the rise with the supply of finished steroid products.

India

India has a diverse market for human grade anabolic steroids. The business could be described as fairly decentralized, as there appears to be a large number of small manufacturers selling their drugs to independent pharmacies. Fewer products are consistently distributed nationwide. Anabolic steroids are usually sold without a prescription in India, and are available for very low prices compared to Western standards. This allows India to remain a strong source country for finished pharmaceutical products. In addition, the country has a small but growing market for raw steroid materials.

Status: India remains stable as a source country for finished steroid products, and is on the rise as a source country for steroid raw materials.

Thailand

Thailand has a diverse market for human grade anabolic steroids. Pharmacies generally sell steroids without a prescription, although it is illegal to export drug products from the country without a license. Anabolic steroids are available in Thailand for very low prices compared to Western standards. This combination of low price, open availability, and product diversity has allowed Thailand to remain a fairly active source country for anabolic steroids, especially to markets in Western Europe.

Status: Thailand appears to be on the decline as a source country due to increased international pressure and law enforcement.

Region: Americas

Mexico

Mexico has a limited market for human grade anabolic steroids. Most pharmacies are willing to dispense these drugs without a prescription, however. This allows a thriving business to exist throughout the border areas of Mexico, which supply American tourists and smugglers. Mexico remains a fairly strong source country for human grade steroids. In addition, a veterinary market of notable size has remained active after Operation Gear Grinder. A slightly more diverse set of anabolic steroids may be found in this market segment. Given the tightened government oversight of veterinary producers, the most active market segment in Mexico presently appears to be counterfeit and underground steroids.

Status: Mexico once again appears to be on the rise as a source country, fueled mainly by expansion in the counterfeit, and underground manufacturing segments.

Argentina

Argentina has a fairly diverse market for anabolic steroid products. These drugs can typically be obtained in pharmacies and veterinary suppliers without a prescription, and are also easily diverted in bulk at the wholesale level. Presently, the veterinary market is much more active than human pharmacy. This is due mainly to lower prices, especially given the fact that large international companies such as Schering and Organon dominate the human pharmacy market for these drugs. General low cost, lax law enforcement, and open availability allows Argentina to be a key source country for anabolic steroids in the region.

Status: Argentina remains a stable source country.

Paraguay

Similar to Argentina, Paraguay has a fairly diverse market for anabolic steroid products. These drugs are readily dispensed without a prescription in most pharmacies and veterinary suppliers, and bulk wholesale diversion appears to be fairly common. In recent years there has been noticeable expansion in this market. General low cost, lax law enforcement, and open availability has allowed Paraguay to become a key source country for anabolic steroids in the region.

Status: Paraguay appears to be on the rise as a source country.

Region: Former Soviet Bloc

Bulgaria

Bulgaria is a key source country for a limited number of anabolic steroids, mainly testosterone. Various testosterone preparations are available, and can be obtained at some of the lowest prices in continental Europe. Steroids are typically dispensed in pharmacies without a prescription. Low cost, open availability, and lax law enforcement of domestic pharmaceutical regulations continue to facilitate both pharmacy level (retail) and bulk product (wholesale) level diversion of anabolic steroids.

Status: Bulgaria remains a stable source country.

Moldova

Moldova is an active source country for both finished steroid products and bulk underground contract manufacturing. This nation has developed a strong market for anabolic steroids only very recently. Already it offers a significantly larger selection of steroid products than any of the other former Soviet Bloc countries. This, combined with weak ties to the United States and little domestic interest in anabolic steroids, makes Moldova a potentially key nation in the doping trade in the years to come.

Status: Moldova appears to be on the rise as a source country.

Romania

Romania is a key source country for a limited number of anabolic steroids, most notably the oral drug methandrostenolone. Steroids can usually be obtained from pharmacies in Romania without a prescription, typically at very low prices. Low cost and lax law enforcement of domestic pharmaceutical regulations continues to facilitate both pharmacy level (retail) and bulk product (wholesale) level diversion of anabolic steroids.

Status: Romania remains a stable source country.

Russia

Belying its size and historical prominence in the illicit steroid trade, Russia actually has a limited market for anabolic steroid products. Like Bulgaria and Romania, it is known for very low prices on a small number of specific products only, most notably testosterone and methandrostenolone. Anabolic steroids can typically be obtained in pharmacies without a prescription. Low cost and lax law enforcement of domestic pharmaceutical regulations continue to facilitate both pharmacy level (retail) and bulk product (wholesale) level diversion of anabolic steroids.

Status: Russia appears to be on the decline as a source country.

Region: Middle East

Turkey

Turkey has a limited market for anabolic steroid products. Although product diversity is low, this is also the most open source country for human grade anabolic steroids in the European Union. It remains one of the only places where the drugs can be readily obtained without a prescription, and steroid tourism to Turkey is common. Because of this, drugs of Turkish origin are readily found on the international black market. Bulk diversion at the wholesale level appears to be common as well. Large quantities of Turkish drugs, especially methenolone and oxymetholone, often appear throughout Europe, and to a lesser extent United States.

Status: Turkey remains a stable source country.

Egypt

Egypt has limited diversity in its market for anabolic steroids, although it is known to be a very common source country for testosterone and nandrolone products. Anabolic steroids are widely dispensed without a prescription in this country, and sell for extremely low prices compared to Western countries. Of the small number of steroid products that are distributed, significant quantities are readily diverted for sale on the black market. Even when Egyptian steroids are purchased at retail prices in the pharmacy, there is still often enough room in pricing to maintain very strong margins. Low prices, combined with lax laws pertaining to the drug market, continue to foster an environment of diversion in Egypt.

Status: Egypt remains a stable source country.

Pakistan

Pakistan is an active source country for a small number of steroids, most notably nandrolone and testosterone. These drugs can be easily obtained in many pharmacies without a prescription, although bulk diversion is common and accounts for a strong majority of all steroids exported. Prices are very low compared to Western standards, and the market carries both generic drugs and names brands such as Organon and Schering.

Status: Pakistan remains a stable source country.

Iran

Iran has a small but expanding market for anabolic steroids. In addition to those steroid products sold in domestic pharmacies, a number of preparations are made for export only. Prices are extremely low, and there are few obstacles to obtaining bulk quantities of these drugs. In recent years Iran has been a very active source country for testosterone, oxymetholone, methandrostenolone, stanozolol, and nandrolone. Iranian steroids are principally smuggled to Western Europe, although small quantities are shipped to the United States.

Status: Iran appears to be on the rise as a source country.

Region: Western Europe

Greece

Greece has a moderately sized market for anabolic steroids. Historically, it has also been one of the most loosely regulated in Western Europe. For a long time these drugs were very easy to obtain at a pharmacy without a prescription. There was also little monitoring of the wholesale business. Both retail and wholesale level product diversion had been commonplace. In recent years, however, increasing international attention and domestic response has been changing the market considerably. It is now increasingly difficult to purchase these drugs in a pharmacy without a prescription. Bulk diversions do appear to still take place, although apparently less frequently, as Greek drugs are making up a smaller percentage of Western black markets than in the past.

Status: Greece appears to be on the decline as a source country.

Portugal

Portugal has a small market for anabolic steroids, with a variety of products very comparable to other Western European nations. Historically Portugal has paid little attention to the steroid black market, and product diversion at both the pharmacy and wholesale level was common. As such, this was a key source nation for European steroids. In recent years, however, diversions have been reduced. High prices compared to Eastern Europe and Asia have also reduced the interest of smugglers.

Status: Portugal appears to be on the decline as a source country.

Spain

Spain has a moderately sized market for anabolic steroids. In addition to some of the standard medications found throughout Europe such as testosterone, nandrolone, and mesterolone, it is one of the only Western nations to still produce stanozolol and methenolone. Given the high value of these drugs on the black market, Spain remains a key source country for steroids in spite of high prices relative to Eastern Europe and Asia. Product diversion at both the pharmacy and wholesale level appear to still be common, although in recent years government attention to the illegal steroid trade has resulted in a reduction in the quantity of drugs made available.

Status: Spain appears to be on the decline as a source country.

Region: Australia

Australia has a moderately sized market for human pharmaceutical steroids, and a very diverse market for veterinary steroids. Historically, lax regulations pertaining to the export of drugs had allowed Australia to be a key supplier of steroids on Western black markets. The vast majority of the product diversion was taking place in the veterinary segment. In recent years, however, increased international pressure appears to have greatly reduced product diversions inside Australia. Australia is also one of the few nations outside the United States to now have strict laws concerning the possession of anabolic steroids.

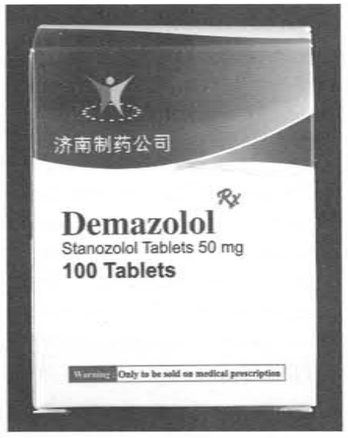
Status: Australia appears to be on the decline as a source country.

An Evolving Consumer Market

The prohibition of anabolic steroids has done much more than just change the source for traditional anabolic steroids. These laws have ultimately been changing, at least in part, the nature of the drugs themselves. What we are specifically speaking about is the trend of developing products that cater to bodybuilders instead of patients, which seemed to have begun (very successfully) in the Mexican veterinary market. This trend was in full force in the new era of underground-dominated manufacturing. With no set rules in place, the underground manufacturers are free to consider the needs of illicit drug users and smugglers alike when developing products. In fact, it could be argued they were financially inclined to do so. The following represents some of the more striking new types of products that have come out by underground labs.

High Dosed Steroids

With no government restraints to be concerned with, underground manufacturers were free to cater to the demand for high dose/high value products. For example, while the Mexican veterinary drug market brought consumers the first 10mg methandrostenolone and stanozolol tablets, these products can be found in doses of up to 50 mg with underground manufacturers. This is 10 times the standard tablet dose of a pharmaceutical form of methandrostenolone, and 25 times that of stanozolol. Virtually every conceivable steroid available can now be found in some highly concentrated form on the underground market.



This stanozolol from Jinan Pharmaceuticals in China (an export only company) contains 50 mg of steroid per tablet. This is 25 times the standard therapeutic tablet dosage of 2 mg.

Designer Steroids

Another consequence of the thriving underground market for anabolic steroids has been the expansion of the raw powder supply. Not only have steroid raw powders become more available in recent years, but the selection of these powders has also expanded greatly. One growing trend among manufacturers is to produce powerful anabolic steroid compounds that are not presently available in the legitimate pharmaceutical marketplace. Sometimes these are very old medications that have been unavailable for decades. In most cases, however, the steroids were never released as prescription drugs at all. Anabolic steroids are actually a very diverse family of drugs, with perhaps more than 1,000 known analogs. This provides a near endless pool of old steroids for underground manufacturers to draw from.

It is of note that the drugs discussed under this heading tend to be collectively referred to as "designer steroids." In actuality, only one (tetrahydrogestrinone, the most famous of the BALCO steroids) was really new in design. Virtually every other recently discovered "designer steroid" had seen some level of clinical experimentation many decades earlier, usually on laboratory animals. This offers some assessment of the anabolic (tissue building) and androgenic (mas-

culinizing) properties of each drug, as the early animal data on steroids usually correlates (at least loosely) with their effects in humans. It is this early research that has actually enabled the modern development of these obscure drugs, and thus it would be more appropriate to consider them to be "experimental steroids."

Given that many of these designer compounds were unknown to lawmakers at the time the Anabolic Steroid Control Acts were passed, they are not all classified as controlled substances in the United States. The penalties for the sale of non-schedule steroids pertain only to their nature as misbranded drugs, not anabolic steroids. While these penalties are potentially very serious, enforcement of these laws has been extremely weak. This has created a great problem in the Unites States. It has been so difficult for U.S. authorities to control the sale of non-scheduled steroids that many are sold openly in health food stores and gyms as "nutritional supplements." Designer steroids have been big business, and are still sold in every State of the union. This is a great contradiction in a nation aggressive about criminalizing anabolic steroids. Only very recently has there been an aggressive government response to the illegal sale of these agents. These actions do suggest, however, that designer steroids may have a very limited lifespan as unrestricted OTC products at the present time.

Examples of "Designer" Steroids:

Methyltrienolone: This oral anabolic steroid is among the most powerful ever chemically synthesized. It is the most potent steroid tested in humans, and also the most liver toxic. This drug has not been given to human subjects in more than 20 years, and is generally deemed too toxic to offer any therapeutic value. This drug is presently available on the underground market, with some consumers finding it attractive to use "the most powerful steroid ever tested on people." Methyltrienolone is a scheduled (controlled) anabolic steroid.

Superdrol (methyldrostanolone): This potent oral anabolic steroid was developed alongside Anadrol (oxymetholone) decades ago, but was never released in its native form as a prescription drug product. Although the incidence of liver toxicity with relation to oral anabolic steroid use is generally overstated, this specific drug has been linked to several cases of severe liver injury. Likely due to its potency and non-scheduled nature, methyldrostanolone has been used to manufacture counterfeit methandrostenolone tablets. It is also widely available on the U.S. sports nutrition market.

DMT (desoxymethyltestosterone): This is the last of the known BALCO steroids, at one time invisible to athletic drug testing. DMT has never been available as a prescription drug product, and therefore has not seen extensive study in humans. What is known of the compound supports the common observation among users, namely that it is a very powerful oral anabolic agent. DMT is available on the underground market, and like methyldrostanolone, has also been widely sold in the United States as a "sports nutrition" product.

(Author's Note: A more detailed analysis of controlled and non-scheduled anabolic steroids can be found in William Llewellyn's ANABOLICS, 9th ed.*)*

Bodybuilder Targeted Formulations

Underground manufacturers commonly blend different steroids together in the same formula, a practice referred to as "pre-stacking." A large percentage of bodybuilders do not take one steroid at a time, but "stack" two or more drugs together. Pre-stacking is designed to appeal to this audience, offering an easier and often more economic approach to multi-drug combinations. These products are typically formulated with a specific effect in mind. For example, there may be a combination of steroids known to help promote mass gains, or a blend designed to help promote fat loss and the retention of lean mass. Such pre-stacked steroid combinations are never used in the

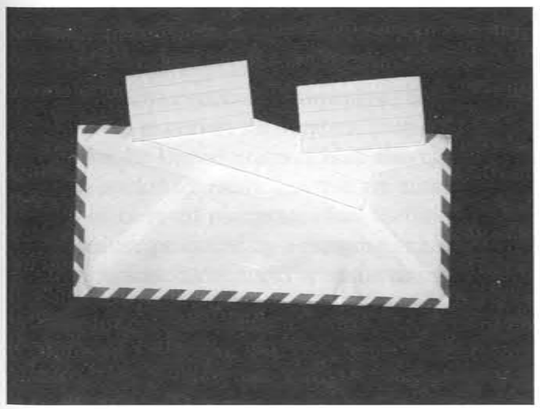


The product "Cut Stack 300" is a good example of a bodybuilder-focused formula unique to an underground lab. This particular item contains a blend of 3 steroids — testosterone propionate, drostanolone propionate (a steroid discontinued many years ago), and trenbolone acetate (a veterinary steroid).

legitimate manufacture of Western pharmaceutical steroids meant for human consumption.

Paper Steroids

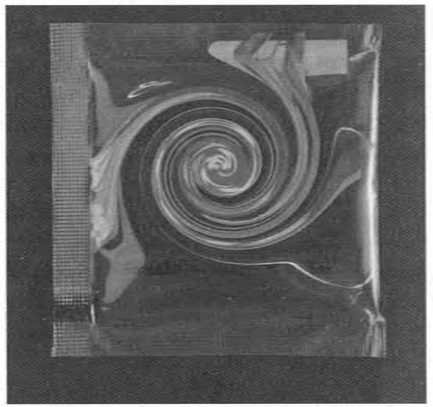
Noticing a weakness in U.S. Customs when it comes to the processing of large volumes of international mail each day, a number of international underground steroid manufacturers have been impregnating blotter paper with anabolic steroids. The resulting "paper steroids" can be sent in a normal letter-sized envelope. The steroid sheet cannot be detected by scent, and when covered by a few pieces of paper is extremely difficult to notice. Given that the interdiction of such a letter represents a very small seizure at best, there is little incentive to invest the resources necessary to effectively screen all of the personal correspondence entering the U.S. A critical evaluation of this practice suggests that the success rate is extremely high, and that only a very small percentage of paper steroids are stopped at customs.



Examples of PaperStrol (blotter paper stanozolol) and PaperVar (blotter paper oxandrolone).

Steroid Sachets

Traditional injectable anabolic steroids come in glass vials or sealed glass ampules. This packaging is bulky, and distinctly pharmaceutical in nature. In an effort to improve customs seizure rates, a number of underground steroid manufacturers are now using small plastic or foil sachets to contain their injectable steroids. Each sachet will typically hold 5 mL or 10 mL of solution, and be intentionally mislabeled in order to confuse customs. The customer will often be given a code to identify the drug. When placed flat in an envelope amongst a few sheets of folded paper, this form of packaging can also be extremely difficult to detect. Furthermore, upon discovery it may appear to be some form of aromatherapy or cosmetic product. Without detailed chemical analysis, which in the



An example of a steroid sachet. The face has been digitally obscured.

case of a sealed pouch would destroy the contents, identification of the product as a steroid is not possible.

Home Brewing

Recently, a growing number of steroid dealers have been in the business of selling raw steroid powder to their consumers. The customer will use the powder to assemble his or her own products, a practice known as "home brewing." The individual will usually obtain only the active steroid powder from the dealer. The remaining materials, which in the case of injectable steroid assembly may include an oily carrier, antimicrobial agents, co-solvents, glass vials, syringe filters, and a hand crimper, are obtained from other sources. There are actually no regulations preventing the sale of these materials, as all are inert and have many commercial uses. As such, a growing network of businesses has grown catering specifically (even if not obviously) to the anabolic steroid using customer. Very often these businesses will identify themselves as "research supply" warehouses.



The practice of home brewing steroids is facilitated by the trade of small quantities of raw steroid power.

The "home brew" business model is advantageous for a number of reasons. For one, it eliminates almost all of the bulk normally associated with anabolic steroids. It has been refined down to its essence — the trade in an active powder. The business is more easily concealed as such, and does not require dedicated space for product storage. The whole operation consists essentially of a small quantity of raw powders, a small digital scale, and plastic bags for packaging the orders (very similar to the retail narcotic trade). Also, this type of business activity completely eliminates the need for a makeshift laboratory, one of the most difficult and potentially conspicuous aspects to the steroid manufacturing business. The customer might also find attractive the significantly lower prices, the less conspicuous nature of small powder orders, or the security of controlling all aspects of the blending.

The API Trade

Anabolic steroids may not be controlled substances in many nations, but they are still medicines. To produce these drugs on the underground, without license, requires access to these medicines in bulk. As you will see when we discuss pharmaceutical grade manufacturing, underground laboratories do not have access to the same highly pure USP/BP/EP grade pharmaceutical active pharmaceutical ingredients (API) used by Western pharmaceutical companies. The Western supply markets are far too regulated for bulk diversion. The raw powders obtained by counterfeiters and underground labs are, therefore, manufactured and traded in a very different arena. In fact, this entire business exists in what could be considered nothing less than an international gray, or even black, supply market.

Pharmaceutical Companies vs. Chemical Companies

The U.S. Drug Enforcement Agency estimates that 99 percent of all illegally manufactured steroids use raw materials originating in China.[34] Like the United States, China has a domestic Food and Drug Administration that monitors the pharmaceutical industry, including raw ingredient manufacturing. The country, in fact, has approximately 700 U.S. FDA approved pharmaceutical companies that legally produce API materials for Western drug companies. But unlike the United States, China also has a thriving open market for medicines that are manufactured outside of licensed pharmaceutical facilities. These medicines are produced by a growing industry of far less sophisticated chemical manufacturing companies. There are approximately 80,000 chemical companies in China. They are unregulated, not inspected, and not required to meet even the minimal of pharmaceutical production standards.

The unlicensed manufacture of APIs in China is an enormous business. In an article appearing in the *New York Times* in October of 2007, one industry insider estimates that approximately half of all drugs made in China are made by rouge chemical facilities.[35] In seeming support of this estimate, the *New York Times* uncovered 1,300 chemical companies that were publicly offering the sale of active pharmaceutical ingredients. These drugs sometimes wind up in legitimate supply channels, although more often they are used to fuel an even growing international trade in counterfeit drugs. The vast majority of steroid materials made in China, of course, come from these unlicensed chemical suppliers, and were not diverted from licensed pharmaceutical manufacturers.

Dangerous History

This trend of rouge medicine production in China has had extremely troubling results in the past. For example, during the mid-1990s, 88 children in Haiti died as a result of contaminated pharmaceutical ingredients that were made by an unlicensed chemical producer in Dalian, China. The company had exported what was labeled to be pure glycerin, but instead contained a percentage of dimethylene glycol (antifreeze). A decade later, 138 people died in Panama as a result of cold medicine made with adulterated material from China. Again, the contaminant was dimethylene glycol, and again an unlicensed chemical producer was to blame. China seems to strongly encourage commerce and exports, and rarely prosecutes chemical companies that make APIs. In both the Haiti and Panama poisoning cases, no sanctions were ever made.

Steroid Purity Problems

Many Chinese chemical producers have the basic ca-

pacity to synthesize a variety of APIs, including anabolic steroids. Hormone-based drugs like these are not especially difficult to make. The same types of basic chemical facilities, however, absolutely do not have the capacity to produce these same hormone drugs purely, to USP/BP/EP medicine standards. In fact, the steroid API materials produced by Chinese chemical facilities are often extremely low in purity. They may be contaminated with heavy metals, industrial solvents, chemical intermediaries, and any variety of other foreign materials. Furthermore, these chemicals are often traded through a variety of importers/exporters and supply chain middlemen, many of whom rarely test the materials they trade themselves, before ever reaching an underground manufacturer. In many cases, the materials are intentionally mislabeled or "cut" along the supply chain to increase profits.

This section is not meant to imply that all underground and counterfeit drugs contain dangerous contaminants. Indeed, highly pure steroid APIs are obtained by many resourceful underground manufacturers, and many underground and counterfeit drugs are sterile and free of obvious gross adulteration.

Chemical Analysis Report

Set ID # 702044-1

Set Description : 1 lot of powder
Date Received : 02/09/07
Date(s) Analyzed : 02/26/07 thru 02/28/07
Date Reported : 03/05/07

Directed To :

Sample Preparation and Analysis Conditions :

For turinabol, a weighed portion of the sample was dissolved/extracted in 1:1:1 – acetonitrile/methanol/water, filtered, and then analyzed under the following instrumental conditions:

Chromatograph : High performance liquid chromatograph (Hewlett Packard Model 1090 II / L)
Column : Synergi Hydro-RP, 150 x 3.0mm, 4µm, 80Å
Detector : Photodiode array, scanning from 190 to 600 nm; quantitation at 245 nm

Analytical Results

Reporting results to three significant figures is for statistical evaluation only and is not intended to be an indication of analytical precision

Sample Identification		Turinabol mg/g
Laboratory ID#	702044-1	402.*
Client ID#	Raw Powder Lot# C 061208	

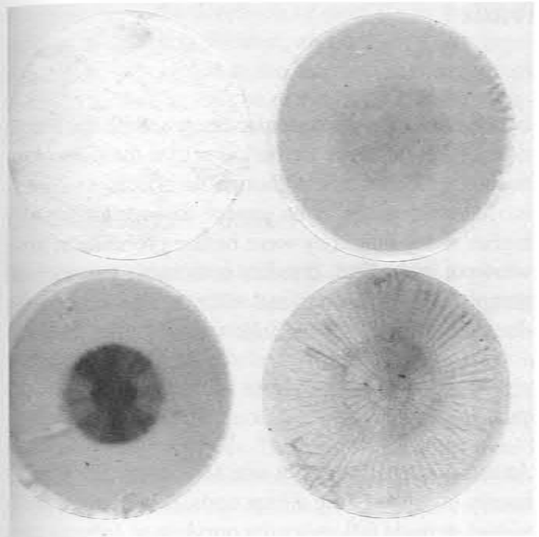
Note(s): * The sample does contain additional components which appear to be steroidal in nature.

Analyzed _____ By Release Authorized _____ By _____ Date

Page 1 of 1

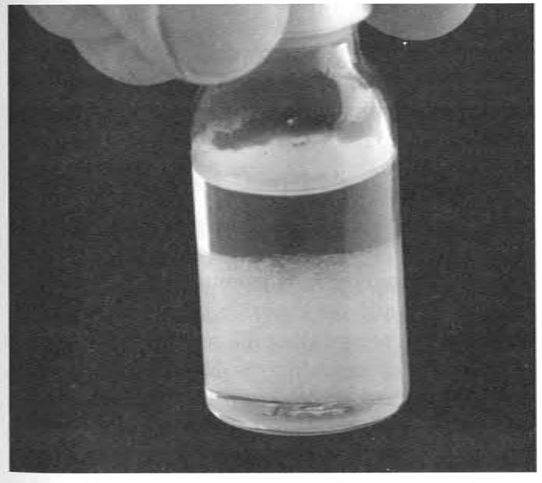
The results provided in this report represent to the fullest extent possible under the criteria for good faith and professionalism in the field of analytical chemistry, true and factual data that are provided for the sole use of the addressee. Any use of the report or its contents except under the guidelines of this expressed intent is not condoned or permitted.

Lab test results on a low-quality batch of raw steroid material. This batch was only 40% pure, and produced tablets that were very underdosed.



Each of the four filters above was used to help remove the contaminants from steroid raw materials. The filter on the top left shows very little residue, as it was used to clean a very pure batch of material. The remaining filters were used on batches with varying high levels of particulate contamination.

Cases of life threatening poising due to contaminated steroids are also highly uncommon (although not completely unheard of). Still, it is important to emphasize that the market for Chinese steroid materials, the same market fueling the rapidly expanding underground manufacturing industry, remains unregulated and highly uncertain. Individuals are warned that the actual source of steroid materials used to make counterfeit and underground steroids is far removed from the strictly regulated bulk medicine market in Western countries.



This vial was made with material that had been cut with polymers by a middleman raw powder dealer. When the powder was added to oil it produced a thick gel inside the vial. This steroid is not only completely useless but also potentially dangerous.

Difficulties Circumventing the Steroid Trade

Anabolic steroids are unlike traditional drugs of abuse. They are not taken for a subjective feeling of euphoria ("high"), but to improve the physique or athletic performance. Use tends to involve carefully planned schedules of on and off periods of intake, and not constant chronic abuse. In general, those using anabolic steroids tend to behave not like traditional "drug addicts," but like most Americans, maintaining a job, paying their bills, and not getting involved with other crime. The underground steroid market is, likewise, extremely challenging for law enforcement to effectively understand and infiltrate. This section pertains to some of the most notable difficulties law enforcement will face in any attempt to appreciably circumvent the illegal steroid trade.

Perceived Lack of Harm

It is difficult to significantly impact the drug trade with prohibition laws without simultaneously reducing the demand. This has proven to be extremely difficult with drugs of low perceived risk among users. For example, prohibition laws appear to have had little effect on the usage rate of alcohol or marijuana in Western nations. Alcohol prohibition officially failed, and by many accounts the prohibition of marijuana is an ongoing failure of equally epic proportions. In both examples, prohibition seems only to have driven the market underground. These examples support the idea that if an individual perceives that the only problem with their use of a substance is that it is prohibited, they will conclude the law needs to be changed, not their behavior.

Arguably, anabolic steroids are acutely very safe drugs. There is no reasonable possibility of overdose, and immediate injury is extremely uncommon. Most users know this about anabolic steroids very well. Heath risks are more tangible with long-term abuse, of course, and may involve (most notably) an increased risk of cardiovascular disease. Still, the health risks of steroid abuse are far lower than the risks of tobacco or alcohol use. Although no official study exists, steroid usage rates appear to be significantly higher today than they were before prohibition laws were put into effect. It seems reasonable to conclude that prohibition has not, and will not, significantly reduce the demand for anabolic steroids among users.

Product Diversity

Anabolic steroids are not one substance, but a large family of related drug compounds. A total of 53 individual steroids fall under the purview of federal controlled substances laws. Hundreds if not thousands more have been studied but never released as prescription drug products. These drugs were unknown at the time the controlled substance laws were passed, and therefore are not considered controlled substances. Any one at any time may be released on the underground market as a designer steroid. Law enforcement has the extremely difficult task of becoming familiar with this very large group of drugs, and also differentiating between those that are controlled substances, and those that are not.

Availability is Global, Prohibition Isolated

Anabolic steroids have numerous important medical applications, and are available in all developed nations. For this reason alone the continued widespread manufacture of these drugs is assured. The vast majority of countries do not have laws criminalizing the possession or use of anabolic steroids for improving muscle mass and athletic performance as well. Steroid prohibition is arguably an American concept, and has spread only to a small number of countries with close ties to the United States. Even Canada does not criminalize the personal possession of these drugs. In many nations, the diversion of steroids to the black market is easily facilitated, and presents low legal risk. This suggests that the international supply of these drugs will always be extremely difficult to control.

Undetectable to Canines

Canines are not trained to detect the scent of anabolic steroids. There are extreme obstacles to developing such a program. Presently, 53 steroid drugs are scheduled as controlled substances. Each can possess a unique scent. Furthermore, the majority of the weight of any steroid product consists of inert carriers, such as tablet binders and oils. The training program would have to involve the differentiation of dozens of different steroids among dozens of common carriers. Canines are only trained on a few scents at a time, and usually specialize (e.g., drugs, currency, humans, agriculture). The task of training a canine to alert on even a dozen or two-dozen of the most popular illegal steroids seems insurmountable. Furthermore, the canine cannot be trained to detect the scent of common steroid carrier oils or inert binders, as it would then not be able to directly detect the illegal drug. As such, if steroids were found, any search would be readily (and validly) challenged in court.

High Profit, High Yield

Anabolic steroids can be an extremely high profit, high yield illegal commodity. For example, 1 Kilogram of methandrostenolone powder can supply 200,000 doses or more. This equates to a four to six week cycle for at least 2,000 users, and a retail ("street") value of over $250,000. At an average cost of only $1,500-2,000 per kilogram, the profit margin can be extremely high, in excess of most other illegal commodities. A small underground manufacturer can, in fact, produce a million dollars worth of steroids with just a few business-letter-sized parcels filled with powder. The low interdiction rate from China and high profit margin provide very strong incentive to engage in illegal steroid manufacturing.

Non-Traditional Smuggling Routes

The smuggling routes for steroids are often different from those of common prohibited drugs. For example, virtually all of the raw materials for the now dominant underground manufacturing market come from China. China is the leading supplier of manufactured goods to the United States, and sends an enormous volume of mail through U.S. Customs processing each day. Steroid raw materials may also first be smuggled into Western Europe, and thereafter to the United States, removing the drugs from traditional narcotic smuggling channels. Without canine scent detection, small and often mislabeled parcels frequently slip by undetected.

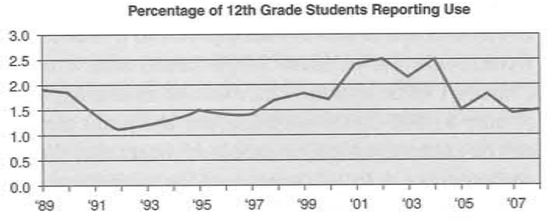
Steroid Usage Trends

History has shown us that if people disagree with a law that makes it illegal to consume something they do not view as dangerous, they are unlikely to change their behavior to conform to it. This has been proven time and again with marijuana. For nearly a century, many Western governments have viewed this drug as having no medial value, and claimed it to be dangerous and easily abused. In spite of this position and criminal laws, marijuana has not been made unavailable. Instead, an extremely strong and active culture of marijuana smokers has grown worldwide, which flatly disagree with assessments of marijuana's dangers. Movies, magazine, and celebrities embrace the relatively benign nature of the cannabis plant. In short, there is little tangible proof that prohibition laws are actually dissuading society from marijuana use.

In fact, evidence suggests that marijuana prohibition does not significantly reduce its consumption at all. Portugal and Holland represent excellent modern examples of this. Both countries have completely decriminalized the personal consumption of cannabis in recent years. This has not resulted in a lasting increase in marijuana use. In fact, marijuana consumption has been substantially reduced in both countries. These nations now have lower usage rates than their more prohibitive neighbors. Eddy Engelsman, the former Dutch drug czar, once explained that Dutch policies of decriminalization have, "succeeded in making pot boring." Perhaps they have. In spite of the Dutch having legal access to the drug through hundreds of regulated coffee shops across the country, Americans are more than twice as likely to smoke marijuana.

Have anabolic steroid prohibition laws reduced steroid use and related harm, or are we faced with another ineffective marijuana-type prohibition? This is a difficult question to answer with exact certainty. Awareness of anabolic steroids and their athletic benefits were dramatically expanding during the early 1990s, a time when federal criminal possession laws were first enacted in the Unites States. Knowledge of their potential health risks was also increasing at the time. This makes it is impossible to say for sure what factors have been influencing their usage rates, or how readily they would be used in a non-criminalized market. At best we can look for certain overall trends — for example, if there was a substantial reduction in steroid use in the years after 1991, when the first criminal possession laws went into effect.

United States law enforcement has not been closely studying the changing illicit market for anabolic steroids, or their usage patterns, until very recently. As a result, there is not a great deal of historical data on their usage to draw from. One of the most commonly referenced sources of information that has been consistently collected year after year (and often cited in federal reviews of anabolic steroid use) is the Monitoring the Future program at the University of Michigan. This program studies illicit drug usage trends, availability, and general attitudes in American students by use of a large anonymous survey. Steroids have been included in this survey since 1989. For our purposes, we will examine the data obtained from 12th grade students, which is the oldest group studied, and also the most likely to use anabolic steroids.



Source: Monitoring the Future, University of Michigan 2008 Report

According to the program data, there has not been a substantial reduction in steroid usage rates since the introduction of steroid prohibition. In fact, at all times since 1991 (except 1992, which noticed a .1% reduction in use) steroid use has been equal to or higher than it was when criminal possession laws were first introduced. Of all years since this data was collected, steroid use among 12th grade students was at its peak between 2001 and 2004, more than 10 years into active prohibition. As of the last release of these figures (2008), steroid use remained substantially above 1991 estimates. Although we cannot know for certain what the usage rates would have been if prohibition was never enacted, it is clear that criminal laws have not resulted in low levels of consumption. It is logical to wonder if prohibition is dissuading steroid use, of if (like marijuana) a strong majority of users disagree with prohibition, and will not conform to it.

Here are some other figures to consider, although they are not from the same source. In 1994, 1,084,000 Americans, or 0.5% of the adult population, said that they had used anabolic steroids, according to the Substance Abuse and Mental Health Services Administration's National Household Survey on Drug Abuse. In 2000, estimates indicate that there are as many as three million AAS users in the United States.[26] It is also estimated that by 2009, 2.7-2.9% of young American adults have taken AAS at least once in their lives. By comparing these figures, we are seeing a strong trend toward increased total steroid usage over time. Again, it does not appear that prohibition or related education have been resulting in a decrease in steroid usage.

Pharmaceutical Steroid Manufacturing

Pharmaceutical Manufacturing (Aseptic Processing)

With Western steroid prohibition pushing the drug supply chain further and further underground, clandestine laboratories now account for a majority of the products sold on the U.S. black market. In many other markets internationally, underground products are, at the very least, accounting for greater and greater percentages of the products sold. It truly is a changing market, and it is important to understand these changes. Especially important is to grasp the potential differences between drug products made by registered pharmaceutical companies, and those made by illicit underground manufacturing operations. In this section we will begin this discussion by examining the manufacturing requirements of a registered Western drug company.

Aseptic Processing

We need to start our discussion by examining the pharmaceutical manufacturing concept known as aseptic processing. This refers to the manufacture of drug products free of contamination by harmful bacteria, viruses, or microorganisms. This is especially important with injectable medications, as the human body's normal defenses against infection are bypassed when a drug is introduced directly into the body. The theoretical risks of injecting a contaminated drug product are innumerable, and range from simple injection-site infection, to life threatening allergic reactions or illness. Nobody should willingly ever ingest a dirty or low quality steroid product.

We can use the U.S. FDA as a good example of how a Western nation handles the manufacture of drug products. Years ago, the FDA instituted what it calls Good Manufacturing Practice (GMP) regulations to assure the general public was protected from the risks of contaminated pharmaceuticals. These GMP rules have strict requirements for assuring global aseptic processing and satisfactory product purity and sterility. All drug companies must adhere to these very strict regulations. The exact regulations are many, such that charting them all here in detail would require dozens of pages of text. Instead, we have summarized and highlighted some of the most key points to these regulations. As you will see, producing a certified sterile and pure drug product in a country such as the United States is no simple matter.

Clean Rooms

One of the fundamental requirements for aseptic drug manufacturing is the isolation of what are defined as clean manufacturing rooms. These rooms are to be completely sterile. To accomplish this, the room is supplied with HEPA filtered air under positive pressure to prevent outside air from leaking in. Filtered air must be regularly monitored for microbiological and particulate content. Airflow is strictly controlled, so that there is no turbulence, eddy currents, or stagnant air in the room. Temperature, humidity, and lighting are also strictly controlled. All exposed surfaces in the room must be smooth and unbroken, in order to minimize the shedding of particles and facilitate disinfection.

Ledges, shelves, cupboards, and unnecessary equipment are generally excluded from clean rooms, and doors are designed so that all surfaces are easily disinfected. False ceilings are sealed to prevent contamination from the space above, and all pipes, ducts, and other utilities are installed in ways that do not create recessed (hard to clean) surfaces. No sinks or drains are allowed in clean rooms. General room sanitation is strictly outlined and documented, and the disinfectants themselves must even be periodically monitored for contamination. All of these requirements are designed to minimize the introduction of biological or other harmful contaminants, or the generation of particles that can serve as vehicles for biological contamination.

Sterile Ingredients (USP, BP, EP)

The FDA requires that only sterile and pure ingredients be used in the manufacture of drug products. The standards for such assurances are set forth by the United States Pharmacopeia (USP), which is an independently owned and funded organization comprised mainly of health care professionals. USP's standards are recognized and used in many other countries, some of which have established their own similar organizations. In the United Kingdom, for example, one can find the organization British Pharmacopeia (BP). Other European nations follow the European Pharmacopeia (EP).

If you look at an ingredients list for a steroid made in the United States or Europe, it will often list the abbreviation of the local drug convention. For example, testosterone cypionate is often listed as something like "testosterone cypionate injection, USP" in the United States. A steroid label may read something like "testosterone propionate, BP" if the paperwork were for a British drug. USP/BP/EP guidelines are fairly complex, but in general they assure that each ingredient is manufactured, filtered, sterilized, and validated to specific high standards. Ingredients that meet USP/BP/EP standards are ultra pure, and can be significantly more costly to procure than those that are made to lesser purity standards.

Sterile Components

All containers used for the packaging of a drug product under GMP rules must be sterile, airtight, and tamperproof. If the container is the type that is opened on more than one occasion, it must be designed so that it remains airtight after each closing. The container itself must be made of inert, non-shedding, sterilizable, and cleanable materials, such as glass, plastic, aluminum, or stainless steel. All components in the container closure system must be inspected for proper seal. The compatibility of the various components and ingredients must also be demonstrated beforehand by experimentation. Included in this process is a microbiological penetration test, to assure biological contaminants cannot penetrate the packaging.

Human workers generally monitor the filling lines. Any component that is seen to have a visible manufacturing flaw must be discarded. Any cleaning process used with the containers and closures before filling must be validated for sterility. The final assembly of sterile components must also take place inside a sterile (clean) room. Containers are closed immediately after filling and sampling, to avoid contamination and the uptake of moisture. Automated production equipment is used to apply the proper seals, which itself is rigorously sterilized between uses, or sometimes even periodically during the same production run.

Personnel and Clothing

GMP guidelines also call for strict requirements regarding the education and dress of personnel that work in clean rooms. To begin with, only the minimum number of employees necessary for any given operation should be in the clean room. Extra people are unnecessary and create the potential for error or contamination. The training for each clean room operator must include proper hygiene and the basic elements of microbiology. Clean room personnel are instructed to report any health condition that may cause the shedding of microorganisms, and are required to undergo periodic health checks for such conditions. A sick worker must never enter a clean room.

Changing and washing follow a written procedure designed to minimize contamination of clean area clothing. Wristwatches, makeup, and jewelry cannot be worn in clean areas. Headgear is worn to totally enclose hair, including beard and moustache. A facemask must be worn to prevent droplets of saliva from contaminating sterile materials. Sterilized non-powdered rubber or latex gloves are worn on the hands at all times in the clean room. Gloves are to be regularly disinfected during operations, and will be changed every working session. Clean sterile protective garments are provided for every new work session. Clean room garments are designed to shed virtually no fibers, and will protect sterile materials from the shedding of particles from the body.

Post-Production Testing

Even in the face of all of these requirements to assure sterility and purity during manufacture, the drug product is inspected again at the conclusion of production for possible particulate or biological contamination. This is usually done with in-house chemical analysis equipment such as HPLC/GC, FLIR. A single vial or bottle of contaminated product is cause for a full investigation of the line and equipment. During such investigation, the entire production lot will be quarantined. Depending on the size of the production run and nature of the contamination, often a single unsatisfactory test will be deemed sufficient cause for the destruction of the full production run. U.S. manufacturers understand that the potential losses from lawsuits alone (if they were to release impure product) are far greater than the financial loss of a destroyed run of product.

The Inside of Injectable Manufacturing

Steroid product production at a licensed pharmaceutical facility can be a very methodical process, with many different quality assurance checks and double checks. To see exactly how detailed and time consuming the procedures of making a sterile injectable steroid product can be, we have included a list of production steps supplied to us by Asia Pharma, a manufacturer in Malaysia. The procedure dictates the steps necessary to complete a batch of their testosterone cypionate product, from receipt and inspection of raw materials, to final vial filling, inspection, and labeling. Photographs have also been provided of the laboratory conditions and equipment used in the manufacturing process. As you may note at the end of the procedure sheets, a production advisor and quality control manager are both required to oversee and verify that the steps of production have been met, and the final product is accurately dosed and clean.

A critical evaluation of this process notes a couple of things. For one, the process as a whole is extremely thorough. It requires constant checking and double-checking that each step is properly completed, and a meticulous log is recorded of all activities. This is highly important to quality control, as procedures quickly become mundane upon repetition, inviting mistakes. As a Malaysian company, however, the requirements for manufacturing still appear to be slightly less stringent than those of United States and European guidelines. For example, while the air is filtered down to .22-microns in this laboratory, the solution is only filtered to .45-microns. This level of solution filtering was standard in the United States up until the 1960s. It has, however, since been upgraded to .22-microns. Still, we can say that this type of manufacturing is extensively more detailed (and I think much safer) than the assembly process that we observed inside an underground lab, which will be discussed later in this book.

The detailed set of procedures for manufacturing an injectable steroid product in this registered Malaysian laboratory can be found on the following pages. Note that this section is not meant as an endorsement of the quality of products coming from this facility.

MANUFACTURING PROCEDURE: Testosterone Cypionate 200 mg/mL

BATCH SIZE: 50.0 L

Sr. No.	Ingredients	Specification	Qty. Required	Overages	Qty. Used
1.	Testosterone Cypionate	U.S.P	10.00 Kg	3.0%	10.30 Kg
2.	Benzyl Benzoate	B.P.	10.00 Ltr	-	10.00 Ltr
3.	Benzyl Alcohol	B.P.	0.450 Lts	-	0.450 Lts
4.	Arachis Oil	B.P.	30.60 Lts.	-	30.60 Lts

LIST OF RAW MATERIALS:

CLEANING:

The Production Area which is to be used for the manufacture of above product must be cleaned as per the S.O.P.'s. Of cleaning of factory premises and cleaning of Sterile Areas.

LIST OF EQUIPMENT:

A) For Manufacturing, Filling and Sealing Operations:

No.	*Name*	*Capacity*	*Qty.*
1.	Central Air Conditioning to maintain required Class with separate AHU for different areas	48 tons	--
2.	Dehumidifiers	2 tons each	3 Nos.
3.	Automatic Rotary vial washing machine	8000 vials/hr.	1 No.
4.	Auto Dry heat sterilizers with PLC control	40000 vials/load	1 No.
5.	Automatic Four head liquid filling and rubber	5000 vials/hr.	1 No.

No.	Name	Capacity	Qty.
	stoppering machine with flow workstation		
6.	Automatic six head aluminum cap sealing machine	10000 vials/hr	1 No.
7.	Automatic online checking conveyor	----	1 No.
8.	Automatic Bung Washing machine	20000 plugs/load	1 No.
9.	Electronic Balances:		
	a) Platform Balance	200 Kg/sensitivity (10 g)	1 No.
	b) Small Balance	200 g/sensitivity (10 mg)	1 No.
10.	Horizontal Autoclaves	----	2 Nos.
11.	Multi column distillation plant	200 L/hr.	2 Nos.
12.	Pure steam generators	----	1 Nos.
13.	S.S. 316 Jacketed Water for Injection Storage Tank steam heated, fitted with thermostat	1000L/hr.	1 No.
14.	S.S Mixing Tank fitted with Stirrer	---	1 No
15.	Homogenizer	---	1 No

B) For Packing:

1.	Central Air Conditioning	11 tones	--
2.	Automatic Labeling Machine	12000vials/hr.	1No.
3.	Online Packing Conveyors	----	2 Nos.

No.	Name	Capacity	Qty.
4.	Checking Conveyor	----	1 No.
5.	Electronic Weighing Balance	200 Kg/sensitivity (20 g)	1 No.
6.	Electronic Weighing Balance	10 Kg/sensitivity (1 g)	1 No.
7.	Electronic Weighing Balance	200 g/sensitivity (10 mg)	1 No.
8.	Strapping Machine	----	1 No.

All the machines and equipment's as listed above, must be cleaned as per their individual S.O.P.'s.

PRECAUTIONS:

To ensure a quality product, all current good manufacturing practices should be followed such as:

1. AREA AND EQUIPMENTS:

(i) The area should be free from unwanted materials as well as materials from the last batch.

(ii) The equipments to be used should be labeled for product, batch no. and date prior to use.

(iii) The equipments to be used should bear a "clean equipment" tag and wash water analy sis report releasing the equipment is available in case of product changeover.

(iv) All the areas i.e. manufacturing and packaging should be cleaned as per the respective S.O.P.

2. PERSONNEL:

(i) All personnel should be in good health and should practice good sanitation habits.

(ii) Personnel engaged in the manufacture, processing, packaging or holding of drug product should wear protective apparel such as head, face, hands and arm coverings, necessary to protect the product from contamination.

3. *RAW MATERIALS AND PACKING MATERIALS:*

(i) All ingredients and packaging materials must be tested for conformance to written specification.

(ii) Check physically all containers of active ingredients and excipients for physical appearance, color, odors & absence of foreign contamination.

(iii) Weigh all the ingredients by checking the actual quantity for Batch & Q.C, Release No. in the presence of Store keeper, Manufacturing and Quality Control Chemist.

(iv) All the dispensed raw materials should be double checked by the Manufacturing Chemist & Quality Control Chemist.



Weighing raw steroid powder.

4. *PRODUCTION AND PROCESS CONTROL:*

(i) Production records must be complete and accurate reflecting all the procedure and process adopted during production.

(ii) Batch should be fabricated strictly as per the written procedures and any deviation in the process should be approved by Q.C.

5. *GENERAL INSTRUCTIONS:*

(i) To prevent mix-ups during production stages, material under-process shall be conspicuously labeled to demonstrate their status. All equipment used for production shall be labeled with their current status.

(ii) Packaging lines shall be independent and adequately segregated. It shall be ensured that all leftover of the previous packaging operations, including labels, cartons and caps are cleared before the closing hour.

(iii) Before packaging operations are begun, steps shall be taken to ensure that the work area, packaging lines, printing machines, and other equipment are clean and free from

any products, materials and spillages. The line clearance shall be performed according to an appropriate checklist and recorded.

Following practices should be done during the handling of the product:

1. Work surfaces should be covered with disposable plastic backed absorbent paper.
2. Surgical facemasks of good quality should be worn.
3. Adequate washing facilities & suitable eyewash should be easily available for immediate use in the event of contamination of the eyes, mucous membranes and skin. Copious amount of tap water should be used if eyewash is for any reason not available.
4. Protective goggles or glasses should be used.

Receipt of Raw Material and Packing Material:-

Manufacturing chemist should prepare the requisition slip for the procurement of Raw Materials, Packing Materials according to the batch size. The Analytical Chemist should counter check it. Only signed requisition slip should be sent to the store in charge.

All the raw materials must be issued from the tightly closed containers and the containers must be pasted with the approved green slips having Batch No., Date of Manufacturing, Date of Expiry, Quality Control Reference No. along with other details. Testosterone Cypionate must be issued from tightly sealed container. All the raw materials must be transferred aseptically to the sterile area duly labeled showing name of the product along with gross weight & net weight.

All the packing materials must be issued from the store, as mentioned in requisition slip. Only those packing materials should be issued which confirm the norms/specifications fixed by the company, passes the specifications given in Official Pharmacopoeia and pasted with green slips marked with 'passes' along with Q.C. Reference No. Before to start the manufacturing process a requisition slip indicating the commencement of batch is prepared and sent to the Q. C. Dept., so they can withdraw samples for bulk testing from anywhere they want and also check the manufacturing is been carried out as per the WHO cGMP guidelines.

To manufacture listed product-manufacturing activities should be divided in three parts:

A) Washing & Drying/ Sterilization/ Depyrogenation of the vials, rubber closures & aluminum seals.

B) Manufacturing, Filling and Sealing.

C) Checking

D) Labeling & packing

A) WASHING & DRYING/STERILIZATION/DEPYROGENATION OF THE VIALS, RUBBER CLOSURES & ALUMINIUM SEALS:

Vials, rubber closures & Aluminum seals should be transferred safely to the production area. The complete procedures of washing & Drying/Sterilization/Depyrogenation of vials, rubber closures and aluminum seals are given in their respective S.O.P.s. Switch on the Air handling unit (AHU), compressors and dehumidifiers of the manufacturing, filling & sealing area and note down the temperature and humidity at 30 minutes intervals. Start doing the work when humidity and temperature are maintained i.e. 45% and 220C respectively. Once the complete production line has attained the required temperature & humidity, start the operation.

B) MANUFACTURING, FILLING AND SEALING:

Stage – 1 Solution Preparation:

1.1 Take oil heating tank, set the thermostat at 150°C. Put Arachis Oil & Benzyl Benzoate in oil heating tank and turn on the heating device, wait till the temperature reaches 150°C, continue the solution to heat at 150°C for further 30 minutes. Turn off the heating device and cool the liquid up to the temperature of 80°C. Mark it 'A'.

1.2 To tank 'A', add step-wise with stirring Testosterone Cypionate & Benzyl Alcohol. A clear solution should be obtained. Flush nitrogen for 5 minutes.

1.3 Allow the solution to cool up to 25°C. Check the Volume; it should be 50.0 Lt., flush nitrogen for 5 minutes.

Quantitative test for bulk solution

1. Description: A pale yellow oily solution.
2. Identification: Must be positive for Testosterone Cypionate.

3. Assay: Must not be less than 100% of the declared contents.



Receive the report of the bulk solution for quantitative testing from the laboratory in respect of its Description, Identification & Assay. If the report states passes, allow the solution for filtration and further for filling and sealing.

Stage-2 Filtration:

Attach filtration tanks with filtration assembly consisting of:

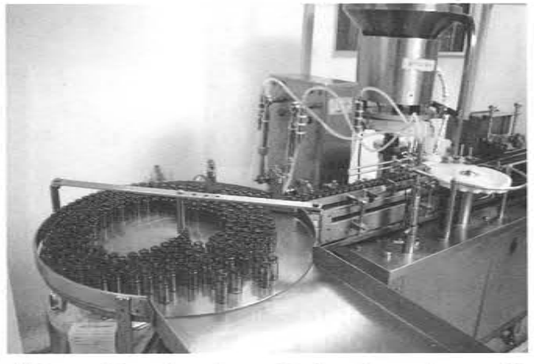
- Nitrogen supplying pipe line
- Air filter (0.22 μ)
- Air Pressure Gauge
- Membrane holder fitted with Pre filter (1.5 μ, 279 mm) membrane filter (0.45μ, 293 mm).

Inlet tube of the membrane holder is attached with the filtration tank and outlet tube of the membrane holder is attached with the sterile storage-filling vessel tank.

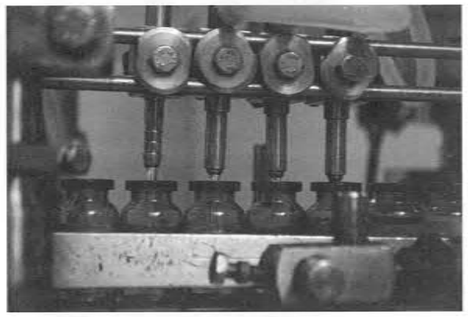
Filtration should be done under nitrogen pressure. Not more than 2 kg/cm2 should be applied.

50 Ltr solutions are approximately filtered through 0.45 μ membrane filter in 130 minutes.

Stage-3 Filling & Sealing of Vials:



3.1 Transfer the filtration/filling tank con taining filtered solution into the filling area, which is adjoining to the manufacturing area. Keep the tank near the automatic Vials filling & sealing machine. Fix the sterilized syringes to the filling machine. The filling machine must have the arrangement of pre & post Nitrogen gas flushing i.e. into the empty Vials as well as filled Vials. Attach the transparent silicon tubing already attached to the syringes with the filling vessel. Operate the machine & release the nitrogen gas, arrange sterilized empty vials, which are to be filled on the hopper of the vials filling machine.



3.2 Adjust the syringes on the desired volume i.e. 10.1 mL and check the volume with accurate calibrated syringe, after confirmation of the accuracy of the volume, start the machine. Now, the vials are coming from hopper to the filling needles of the vials filling machine simultaneously the nitrogen is being flushed in empty vials to remove oxygen & other gases. As soon as the vials come in the middle of the needles of the syringe, the liquid starts to flow & fill the adjusted capacity i.e. 10.1 mL, this machine works on the system, no vials no filling. At this stage after filling once again the nitrogen is flushed into the vials containing liquid to remove further any gas.

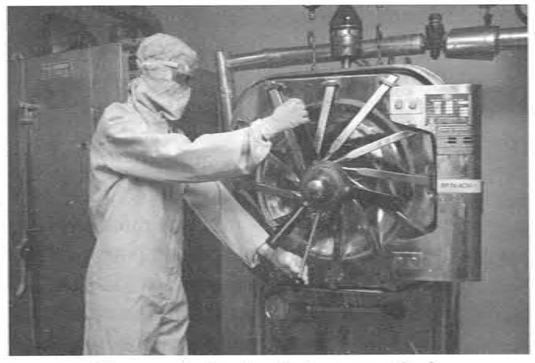




3.3 All the filled & sealed vials are collected in suitable steel containers and the job cards mentioning name of the product, batch size, batch No are placed on the containers. These crates are transferred to the Labeling and Packing area.

Terminal Sterilization:

Vials are sterilized by heating in an autoclave at 10 lb pressure, 105°C for 20 minutes.



Pharmaceutical containers being steam sterilized.

C) CHECKING OF VIALS:

The vials should be free from any cracks, black particles, glass particles, and fibers. Should not contain, more or less volume than the specified volume and the solution should be clear. All the vials should be checked under proper arrangements of light fitted with black and white background. For white particles the vials should be checked under black background and for black particles the vials should be checked under white background. The rejected vials are kept in a separate container marked with label `rejected vials' and the 'passed vials' should be collected in containers marked with labels "Checked and passed". The rejected vials should be destroyed completely under the supervision of the in charge of the department and such type of destroyed vials should be recorded. The passed vials should be sent to the labeling area.

D) LABELING AND PACKAGING:

i) Printed Labels, printed cartons, boxes should be transferred safely to the packing area. Before labeling, the vials should be cleaned to remove solution stuck to surface. Arrange the cleaned vials in trays and allow drying under air. Before using the labels all the parameters printed on them should be checked strictly by the approved technical staff. The parameters are as follows:

1. Product Name
2. Formula
3. Quantity
4. Name & address of Manufacturer
5. Handling Instructions.
6. Storage conditions
7. Dosage
8. Route of Administration
9. Batch No.
10. Date of Mfg.
11. Date of Exp.

ii) Labeling of vials is done by automatic labeling machine. Machine should be cleaned as per S.O.P. of labeling. After verifying the label is correct in all respects. Transfer the labels on automatic vial labeling machine and place the label at the particular place meant for storage of labels, adjust the allotted Batch Number, manufacturing date, expiry date

on the batch coding machine which is part of the machine and put the ink into the box meant for ink which is also part of machine.

iii) Start the Machine, the vials travel from the turntable and the labels come from the label box individually. Simultaneously batch coding is done before the label is fixed on the vial; the batch printing machine prints the Batch No., Mfg. Date, and Exp. Date on the label. After that the gum is released from the gumming box and is spread on the label, the label gets fixed on the vial. Now the vials travel on the packing belt. The whole procedure is automatic & this machine works on the principle no vial no labeling.

iv) Vials are packed as per details in Product Information sheet. Boxes are packed in 5 ply corrugated cases duly strapped and labeled. Master carton should be labeled with the slip mentioning 'HANDLE WITH CARE' having the following details:

Product Name :
Batch No. :
Mfg. Date :
Exp. Date :
Quantity :
Gross Weight :
Net Weight :
Size of the carton:
Name of Consignee:

The finally packed goods are transferred through lift to finished goods quarantine area.

E) ***<u>TESTING OF THE PRODUCT:</u>***





The request should be made to the Quality Control Department for the drawing of the sample. The sample should be drawn as per the SOP of sampling. The product should be tested completely as per the test given in United States Pharmacopoeia.

After receiving the report, if it confirms and complies then a release order should be received from the Quality Control Department and the goods should be transferred to the warehouse.

SIGNATURE REQUIRED
Production Advisor

SIGNATURE REQUIRED
Q. C. Manager

The Intricacies of Tablet Manufacturing

As with injectable steroids, the U.S. Food and Drug administration requires strict adherence to aseptic processing regulations for the manufacture of oral steroid products. This includes all of the previously discussed standard precautions with regard to material purity, clean room air filtering, disinfection, personnel management, and routine monitoring of quality. In addition, there are many things specific to the manufacturing of tablets that all operators need to be aware of. Contrary to the common understanding of tablet making as the simple feeding of powders into a press machine, the actual process is extremely complicated, with many opportunities for human error. This section discusses some of the principle steps in tablet manufacturing that are required of all registered Western pharmaceutical companies.

Volume = Weight

Tablet presses operate on a principle of volume equals weight. This means that the machines do not weigh each dose of powder before tablets are produced. Instead, weight is achieved by filling a tablet dye cavity (of set volume) with powder. Provided the fill is accurate, the weight of the tablet will be accurate and consistent. The "fill volume" of the tablet dye is, therefore, the central measure of tablet production. Maintaining the proper fill volume throughout all levels of production is, likewise, one of the chief jobs of all pharmaceutical tablet press operators. Unfortunately, this is not an easy task, as there are many factors during tablet press operation that can significantly influence the fill volume, and likewise the dosage and viability of the resulting product.

Powder Flow

The "flow" of the powder is one of the most fundamental attributes to tablet pressing. The powder used to press a tablet must flow smoothly through the pressing equipment in order for it to run accurately. A well-blended powder is described as being fluid like. Granulated sugar is a good example of a material with very good flow properties. Powdered sugar, on the other hand, has very poor flow properties. Because different batches of the same material can have vastly different flow properties, numerous physical attributes are important to each production, not just material purity. It is the responsibility of the production manager at a pharmaceutical company to take all factors into account, and assure that the flow of powder is acceptable at all times of press operation. If fill volume varies significantly, drug dosage will be inconsistent, and the product cannot be sold.

High-speed tablet press. Photo courtesy of Asia Pharma.

Many different physical properties of a material can alter its flow. For example, the size of particles that make up the powder can play a substantial role in dictating how it flows. Our powdered sugar example illustrates how very fine particles can often be problematic for press operation. At the same time,

milling may be required to reduce the particle size of some materials. The moisture in a material is also important, and significant efforts are taken to assure all excess moisture is removed from the press operating room and all material storage areas. Temperature is also highly important. A tablet press is considered "cold" when it first starts. As it continues to operate, it will heat up. Over time this heating can alter the powder, sometimes significantly affecting its flow rate. Press operators will constantly monitor how the temperature of a press is affecting the volume fill, and make ongoing adjustments accordingly.

Blending for Press

Tablets consist of the active pharmaceutical ingredient, and a blend of inactive ingredients referred to as excipients. These excipients typically include diluents, which are inert materials used to bulk out the tablet, binders, which hold the tablet together, and lubricants, which aid the flow of powder. The production manager will be responsible for making sure that all of the materials used possess the correct physical properties for the blend to run correctly. If some materials have incompatibilities, a process called granulating may be required. Granulating blends the small particles of different materials together into combination (larger) particles. Due to the intricacies of manufacturing equipment, very often the powder blend must even be specifically tailored for the tablet press machine used.



Powder blending. Photo AP.

Tablet Testing



Line for visual inspection of tablet integrity. Photo AP.

Pharmaceutical companies are responsible for monitoring the quality of all tablets produced. This is a continuous process, where random samples are taken at different times of operation, and analyzed for various attributes. These include tablet hardness, blend consistency, tablet weight, drug dosage, and many other physical attributes. Furthermore, the tablet will go through disintegration and dissolution testing. This testing simulates the environment of the human stomach to assure that the tablets first will break down properly in the stomach (disintegration), and then that the active pharmaceutical ingredient will mix into solution (dissolve) as expected. While it may seem logical that any tablet would be absorbed in the body once dissolved, this is not always the case. For exam-

ple, material granulation often uses coatings that can reduce or prevent dissolution if not properly applied. Only after all aspects of tablet quality have been assessed, and shown to pass quality control standards, are the tablets released for sale.



Tablets being sealed in blister cards. Photo AP

Underground Lab Busts

The Rise and Fall of British Dragon



A book about underground steroids would not be complete without the story of arguably the most important international underground laboratory, "British Dragon." This operation was, for a time, the largest underground lab in existence, and in many ways was representative of the new era of underground manufacturing. There has been much speculation about this lab. Much of it is true, some of it not. This chapter will finally tell the full story of this infamous operation. This information was gathered from official reports, as well as private interviews with people that had been involved with the key players. Full names have been removed from this story to protect those involved (some with active cases against them, and others still in the business).

The Rise

The groundwork for the rise of British Dragon was laid before the year 2000. Back then, it was very easy to import cheap real human grade steroids from Thailand. This country was a literal Valhalla for steroid-using bodybuilders. The pink pentangle shaped tablets of methandrostenolone (Anabol) had an almost mythical reputation. They were so widely known, most people simply referred to them as "pinks" or "Thaibol". Those tablets where manufactured by a genuine Thai pharmaceutical company called "The British Dispensary". Thai online pharmacies sent packages with human grade steroids like Anabol all over the world. The story of the underground lab British Dragon begins here, in Thailand.

A British man called Richard came to live in Thailand after doing jail time for fraud in the United Kingdom. He was determined to make a mark in the steroid business. Richard had taken up with an Iranian partner named Mark, who also referred to himself as Justin. Together, the two men started an underground steroid manufacturing operation. They called it "British Dragon," a name very similar to the popular Thai maker of Anabol. The business started simply — they would copy Thai Anabol. The two men asked a third individual, Kenneth C. (CNK International) in China to mold the pink pentangle shaped tablets. The copy was excellent. So good, in fact, that

the real marker of Anabol (The British Dispensary) started pressing their snake logo in their tablets, and using a golden hologram on their bottles, to differentiate from this counterfeit.

In March of 2000, under pressure from the United States, Thai authorities cooperated to shut down online pharmacies in that country that illegally sold prescription drugs to customers in the United States. These pharmacies sold many drugs including Viagra, tranquilizers, and anabolic steroids. All required prescriptions in the United States, and were being exported from Thailand in violation of local law. Acting on information supplied by U.S. officials, Thai police raided locations in Bangkok and Chiang Mai and arrested 22 people on suspicion of violating Thailand's drug and export laws. The investigators seized nearly 2.5 million dosage units of drugs. This arrest would change the Thai market dramatically.

Following this series of raids it was very difficult to get any illegal products past Thai customs. This would be the breakthrough that launched British Dragon from a small obscure operation, to an enormous multi-national steroid empire. The British Dragon organization was soon manufacturing virtually every popular steroid, both orals and injectables, under their own label. As their reputation grew, they developed their own security measures, such as hologram stickers and custom formed stoppers/caps. The expansions were very fast, and very dramatic. To their credit, the British Dragon group was very enterprising. The lab quickly became one of the leading suppliers of steroids on the black markets of many countries worldwide. Even in the U.S. market, the initials "BD" were well known.

We received lots of mail about British Dragon, but this one we want to quote one. It came from someone close to Richard at one time, though the source wishes to remain unnamed in the book:

"Now that the whole BD thing is over I'll tell you something about British Dragon that I never said before because I didn't wanna stir shit up because at the time this board came online I really didn't know for sure. I used to talk to this guy 'Richard' just about every week circa 2003-04 ; the way they used to do it is he would fly out from Thailand to Greece every month, his friend 'Mark' would meet him there, they would make BD in this little room over there when they met, as he described it there were absolutely no atomised processes there, he said they would just mix the oil and alcohol with the powder in a big glass thing, they would then draw the oil out of the big glass thing into a big syringe, like a 100ml one and then fill up the 10ml vials one by one; I never asked about filtering but it's safe to say that not a single BD vial has ever been filtered or heated, and if it were heated maybe just to get the test prop or tren to suspend fully. Richard described these sessions as marathon, in that they would work for 16 hours straight those few days that they were there and that was that months supply of BD vials. They would then ship to their sources from within the EU. He said that the closest thing they had to any mass production equipment was this little hand-held thing that would put the labels on straight. Labels and tops were the only thing Richard and Mark ever seemed concerned about…".

While the early production methods may have been crude, British Dragon probably did not stay a "garage" operation for very long. With significant money rolling in, the group began improving its production methods. They started to filter through a two-way Millipore system. They wanted to start manufacturing according the pharmaceutical guidelines in Eastern Europe. The group reportedly started having a drug contract manufacturing facility make some of their products. This author (WL) was invited at one time to visit one of their production facilities in Romania. A British Dragon representative explained the whereabouts of the lab, and was extremely anxious for me to verify the sterile nature of their manufacturing procedures. Unfortunately, I was too busy to consider a significant trip deep inside Romania,

and declined. We will never know for sure exactly how clean this manufacturing facility was, only how anxious they were to show it.

The British Dragon organization was lucky to have Mark, perhaps mostly because of his Chinese girlfriend Rebecca. She was able to help the group obtain high quality API steroid powders. This was proven with The Hartford Courant analyses, when some products of the British Dragon where compared with other underground labs and counterfeits. Many Chinese raw materials have a high heavy metal and acid content. This can cause pain even if the benzyl alcohol content is low. Rebecca and Mark had to pay more money for the materials, but they were much more refined than what is usually sent out to other underground labs. Rebecca assured this as she worked with a Chinese research lab to analyze the raw materials. The high quality of the used ingredients amplified the good reputation of the brand name. This, and the strong marketing of a Russian partner named Retabolil. Both Retabolil and Rebecca were very knowledgeable and alert.

In 2004, the British Dragon owners partnered with a well-known East European dealer/re-mailer named Alin. This was initially a very profitable partnership, and opened up strong new markets. Alin brought in a lot of money, especially with high-level dealers. By April 2005, British Dragon was producing in three locations due to the many different geographical regions they had to deliver to. To protect their market they developed a security label scheme. The blue label was for products sold in Eastern Europe/CIS countries. The green label was for the Middle East, and the red label for Western Europe. They protected it further with a special custom green stopper, which had the name and logo of the company.

Alin was a partner/manufacturer in the blue label operation. The British Dragon saw how Alin was able to work "legally" and in a professional way in Eastern Europe. They decided together to register the British Dragon trademark in Eastern Europe, and obtain the necessary licenses for a legal pharmaceutical manufacturing company. BD was trying to go legit. Everything leading up to this point was generally in a positive direction. The lab kept improving its manufacturing, powder sourcing, and potentially forming a real lab in Romania. Things were looking great for the BD team.

As the partners planned to start a pharmaceutical manufacturing company, they needed money for a plant, the licenses, and the necessary equipment. This money was placed into a "registered capital contribution." This is an official agreement where each associate can bring in the capital he desires. The associate then owns the appropriate percentage of the total capital (shares). There would now be four parties officially involved in owning and operating the British Dragon. The first two, of course, were the original founders of BD, Mark and Richard. The third party was Alin, a now major source of sales. Alin, having such a steady establishment in Moldova, was selected as the official boss. He had "power of attorney." Simply said, the power of decision. The fourth member, a man named Roman, looked after the logistical issues with regard to the deliveries. BD seemed poised to set a new standard in the underground steroid business – full registration.

The Fall

A high profit criminal enterprise like that was not destined to last forever. Even early on there were some problems. The original tablet manufacturer Kenneth had agreed to sell the BD tablets only to the group. But he broke this agreement, and sold them to other customers. Soon, a very big Ukrainian supplier by the name of Vadim started buying them. Vadim would be a source of significant problems for BD in the years to come, as there were now two major sources for the same tablets. Vadim and his dealers had the BD tablets but not the injectables. Although we cannot attribute this to Vadim directly, rumors started around

this time that many of the BD injectables on the market were fake. Other rumors were started about Vadim's business. There was too much confusing information about this lab on the underground scene, and many people began doubting British Dragon as a brand. This active counterfeiting would cause even further rifts between the partners.

For a short while, BD was able to reign in Kenneth, and maintain some control over the tablet making. Vadim sold some very successful brands in Russia. For a while, he seemed to ignore BD and focus on other things. But he never forgot the lucrative business that was the British Dragon brand. In the middle of 2005, he tried again to copy their products. This time, his approach was more aggressive. He used attorneys to form an official British Dragon company in the central office tower in Hong Kong. He started selling BD counterfeits through online sites that differed only by one hyphen from the original British Dragon website name. But the British Dragon organization was more prepared this time around. Their regional distributors ("re-mailers") were respected members of top bodybuilding message boards. As soon as Vadim's associates posted their "knock-off " products on the boards, the remailers of British Dragon and the organization itself hit back hard and posted pictures of the counterfeiters on the boards. It turned out to be a very successful strategy.

Vadim's copies were very good. Even in *ANABOLICS 2004*, some pictures of those products made by Vadim were mistakenly printed as the real BD items. These products where actually made in India at BM Pharmaceuticals (the former Haryana Pharma). This pharmaceutical company sold their products to Vadim exclusively. Ironically enough, the end-users rejected these real pharmaceutical-made products as "fakes" and preferred the original BD brand. Since then, this aggressive marketing became part of the British Dragon trademark. As soon as someone had the guts to question the BD quality, he was attacked by a group of people, usually including a site moderator or board owner. They had a common interest. All this became painfully clear as the whole dirty laundry was exposed in public at the end of 2006. At that time, Vadim started, just as Richard and Mark had done, a new brand name called British Pharmaceuticals. Despite the good quality of their products, it did not become a big success.

Counterfeiting would be the least of BD's problems in the long run. All plans for registration were finally halted after the Mexico DEA busts (December 15, 2005). This series of organized indictments and arrests removed the myth that the BD group themselves had come to believe — that being a licensed company would stop any legal prosecutions. In August 2006, British Dragon's original two founders Richard and Mark started the process of getting out of the partnership with Alin. Richard and Mark offered to buy him out, or asked to be bought out. What was perhaps even more crucial to this decision was that the group found out in October 2006 that the U.S. DEA in Vienna, Austria (Vienna DEA country office covers Moldova) came upon information of the BD organization from the DEA's Bangkok office. The DEA had already been tapping their phones and computers. They had names and numbers, and knew Richard was the leader of the organization. The writing was on the wall.

Correspondence from Mark:

> *"I was really scared about *** threats of sending to authorities info before, but as you see on those papers they already know us plus more than 60 other names, the file was honestly 1.4 meters high. There is something big gonna happen this year from DEA I think it is not good to be around to catch the sting from them."*

December 2006. The BD partners know that law enforcement action at some level was imminent. Mark and Richard were anxious to get away from Alin. By now, all of the arguments between the former partners had a financial character. These arguments were

openly discussed on the discussion boards. Many people did not understand why people were speaking about "shares" in an illegal company. It was obvious that the company never officially existed, and the shares did not come from the stock exchange market. Still, there seemed to be strong legitimate fighting over what remained of the now defunct British Dragon enterprise. Mark explained that Alin ultimately stole the company's assets from the other partners. Although Alin was not a majority shareholder, his power of attorney was still in effect. He used this to sell all of the new manufacturing equipment and other property to his new company (which would become Balkan Pharmaceuticals) for $24,000. The building alone, Mark estimated, was worth $150,000 USD. This, of course, was the story as told from one former partner. There are likely other views of what happened, and many details to this business relationship that will never be disclosed.

In March 2007, Mark committed suicide. The story is fuzzy, but we will provide much more detail than has been made public before. Mark was reportedly trying to get on a flight out of Vienna. The DEA regional office that covers Moldova is in Vienna, and Mark was in the country to provide information and try to keep out of jail. He was trying to get on a flight, but was too drunk, and was refused boarding on the aircraft. Mark left the airport to go to a hotel and sober up. He took a room at the NH Hotel in Vienna, on the 6th floor. Our contact suggests Mark was feeling very remorseful about meeting with the DEA. He was reportedly very stressed, very afraid of going to prison in the United States. He had been complaining that Interpol was harassing him for months. He didn't know what to do. Sadly, he decided to take his own life instead of face what was coming, and jumped from the 6th floor to his death.

A year after Mark died, Thai police/DEA finally came for Richard. It began with a raid of his house. They also raided the home of a man named Ashley, who sold paper steroids under the name of RediCat. They didn't find any steroids in Richards house, but they did in Ashley's. Richard was the main target of the raid as they described him as the boss, and Ashley was just someone who worked for him. This is true considering it was Richard that would buy the powder and manufacture the paper products that Ashley sold. In other words, he would make as much money on each of Ashley's sales as Ashley did, and that was small potatoes compared to Richards's distribution of British Dragon products, which was his main business.

Another Email (author withheld):

> *"So once they had them and they started extradition proceedings, Richard decided to fight extradition and Ashley decided to cooperate fully (particularly testifying against Richard). I found odd Richard would fight it since the sentencing guidelines for steroids actually isn't that long-and fighting extradition takes A VERY LONG TIME-at least 2 years, as you probably know GymAce (who didn't fight extradition) spent about 6 months in fed prison before being released. But if you read the indictment for GymAce which was also posted online you will find the answer-the feds wanted millions of dollars in fines from GA. In these cases the feds will usually offer to drop the money laundering charges against the subject if he turns over the loot. Sentencing guidelines for money laundering is 10 years, steroids is only 1 or 2 and you usually get out in 6 months if you behave.*
>
> *Richard is presently fighting the extradition, if he can beat extradition he gets to keep his millions-which he has stashed from Britain to Bulgaria to Thailand, if he gets extradited than he'll be faced with the same predicament, 10 to 20 years in prison or turn over the money."*

On December 2008, Ashley arrived at Los Angeles International Airport from Bangkok. He spent eight months in a Thai prison and fully cooperated with the Thai police, providing them with all information

about his customers and business associates. He was a very organized man. Richard kept a list of his sales, all the bribes and gifts he sent to the moderators of almost every board for a period of almost 10 years. He also kept records of the stock he purchased from all the major suppliers. This was a golden catch for the police and a new source of worry for all of the people on that list. No doubt, U.S. authorities are still working with this information.

Richard ultimately sold the British Dragon website. The new owners have made public plans to bring back BD. They claim that the lab will come back as a fully registered pharmaceutical company this time, selling its products through pharmacies in certain areas of Eastern Europe. If successful, the new owners would realize a dream the original partners had, but could not achieve. Thus far, however, such activity has not been verified. Indeed, the final story of the British Dragon name may not yet be written.

The Paperbol Enterprise

The story of British Dragon gets intertwined with the story of the first "paper steroid" enterprise. Pattaya ,Thailand is where the whole "Paperbol" saga started. More specifically, this all began at the Chevin Gym. Upstairs from the gym was a set of apartments. Here lived three key players. One was a man named Sam, another a British expatriate named William, and lastly Alan C. (his brother Duncan was the owner). Richard used to train at this gym, and a guy named "old George" used to come and drink coffee there. Ashley wasn't there at the time. He was selling real estate and worked for Ideal Homes. The group used to gather here in the late nineties, sitting, talking, and thinking of ideas of how to make money.

By 1999, Richard was supplying three sources based in Thailand with steroids. The drugs were delivered to the United Kingdom, to William (sbc/getwood/grapejuice/newshipping), Ashley (anaboldirect/redicat), and Alan C. (chevinxxx). Alan lost his leg in a motorbike accident, and was known as one-legged Alan. Then William, who was one of Richard's Anabol customers in the UK, came to live in Thailand. In 2000, William decided to stop ordering steroids from Richard, and decided to go into the powder business with the man from the UK known as Old George. They called themselves GetWood. William came up with the idea of ordering kilos of powder from China, and selling 5 grams of powder to customers in the United States at a very cheap price, about $60.

At that time lots of people where already busy creating their own homebrew. They were extracting trenbolone acetate out of "legal" Finaplix veterinary pellets with acetone or solutions they bought on the Internet, like "the magic solution." Also, complete Fina-kits where for sale that included the syringes, the solutions, the vials, etc. Complete forums were devoted to these kitchen brew techniques. People also tried alternative steroid delivery methods like nasal sprays, and topical organic gels and DMSO. Some of the most desperate youngsters even tried to dissolve their pellets in their anus. Once the "powderman" became known through the Internet, most ordered with him.

Richard and Ashley where concerned they would lose customers, so they asked a new chemist also named Alan (Scouse Alan) if he could find a way to put steroid paper on powder. They knew Scouse Alan had lots of Dutch friends in the smuggling business, and thought someone would know how to do it. Nobody could come up with any ideas, so Richard gave Alan a kilo of methandrostenolone and asked him to experiment. It took him five months to come up with a product. It wasn't perfect at the time, but as time went by he slowly perfected the process. Alan started in April 2000 and came up with a reasonable product in September 2000. So that's how it was for a few years. Richard bought kilos of methandrostenolone, stanozolol, and oxymetholone powder from China, and sold tubs of 50g at a time to Ashely (Redicat) and Alan C. (chevinxxx). Ashley and Alan C. paid Scouse Alan to make the product, 2000 baht ($50) for each piece of paper he made. They would become the products Paperbol, Paperstrol, and Paperdrol.

In 2001, the police and DEA busted GetWood. William immediately fled the country. Old George wasn't so lucky, and spent some time in a Thai prison. William reportedly paid one of the most powerful lawyers in Pattaya to pay a Thai man to say that all of the powder belonged to him. This is normal in Thailand. Most lawyers have Thai people who will admit to anything if they are paid enough money. It could be speculated that the real reason for this bust was not the paper anabolics at all, but the fact that U.S. customs noticed more and more Viagra was smuggled into the USA. And the U.S. protects their taxpayers (Pfizer).

In 2002, William moved away from Old George and started doing business with Richard again. Everything worked fine until the end of 2002 when Richard started to order oxandrolone (Anavar) powder, because there was so much money in it. Alan made sheets of Papervar, and they where selling the uncut papers for $1,500 each. Richard decided that they where making so much profit from it, that he would only sell the powder to the distributor that offered him the most money. This was Ashley.

A problem for Richard and Ashley was that at the same time, Kenneth C. started selling powder by the gram, like at the beginning when you could only order powder by the kg. This meant that Alan C. could still manage to get hold of the oxandrolone powder and stay in business. This is when Ashley decided to pay all the moderators and administrators lots of money, free steroids, and expensive gifts like Rolex watches, to say to their members that Ashley was the true legitimate Paperroid supplier. Alan C. asked Scouse Alan if he would still produce it for him, and he said yes. But it was too late. Ashley had already destroyed the name of Chevinxxx on the forums. Alan C. never had anymore orders for the paper.

In February 2003 Alan went on holiday to the United Kingdom. When he came back, Richard had asked his Thai son-in-law to find some way of producing it. He did, but his product was never lab tested. This is also when Richard and Mark (Iranian Mark) started the BD website, and had Richard's family making BD gear in the kitchen. Ashley paid many administrators and moderators of the popular steroid forums to say the British Dragon was a legitimate pharmaceutical factory in Thailand that even produced their own 100% pure steroid powders.

In 2003, Alan and Sam started a business called Paperbolix, their own version of the Paperbol enterprise. Scouse Alan was making the papers. It was him who was responsible for producing the near perfect Papervar sheet that had lab results posted on the Paperbolix website. But the business wasn't very big, and it did not last. Alan and Sam went their own separate ways at the end of 2004.

After this, Alan decided to order his own Cialis powder from China, and to sell PaperCialis to foreigner's in Pattaya for $250 a sheet. It was good business, because the foreigners could easily smuggle these sheets into their own country when they went back. He made a lot of money. Now most of the British expatriates do the same as all the other foreigner's in Thailand — export everything, steroids, sleeping tablets, counterfeit football shirts, dvd's, handbags etc. One of them even took a side step into the porn-movie business, but that is another story.

Major Bust in Bulgaria



Before the year 2000, Bulgaria was for the most part known among bodybuilders for its cheap and excellent methandienone (slang for D-bol) Bionabol (production stopped February 2005) and their NIFI clenbuterol. Around the year 2005, Bulgaria was commonly being named as one of the counterfeiters of human grade AAS. They were together with other notorious counterfeiting countries such as Spain, Macedonia, and Serbia. Later, when the market for underground-produced AAS increased, Bulgaria also started to produce and sell counterfeits of popular underground drugs. Among the popular underground targets of Bulgarian counterfeiters was British Dragon.

To prepare for this book, we had to research the different underground (UG) laboratories that produced their own UG brand names, and as best we could also those that counterfeited human-grade steroids, and gathered samples for analysis. While brainstorming, we decided we would not include our purchased samples from Bulgaria, because most European and U.S. members would never come across these brands. Also, the counterfeits where covered in the *ANABOLICS* book and in our forum, where residents of Bulgaria gave information about their quality.

However, we changed our opinion shortly before the release of this book, because on our forum some Bulgarian members posted links from a Bulgarian newspaper that reported massive busts in July 2009. According to the newspaper, the Bulgarian authori-

ties started a tax action called "operation Tuzari." This operation was meant to identify owners of cars, yachts and property worth over 500,000 euro, and find out whether they have declared that they have the money to afford such items legally.

During this action they came across an individual that, according the newspaper, owned a Ferrari and a yacht in his own name. He was unable to explain where he got the money to buy them. Our source, who is acquainted to this man, said: *"he is a well known businessman and multimillionaire for a long time. It is not unusual for a businessman with huge construction, wholesale and retail business to own an expensive car and boat. They don't let people pay, at least not in Bulgaria. They want to confiscate everything but as I told you, these are PR actions performed every 5 years or so since the middle of 90's with no consequences at all."* Later, foreign offices sent a signal to the prosecution that this businessman was involved in the production and international distribution of prohibited substances. What followed was a mutual action from the Sofia City Prosecutor's Office, DANS (special force), the Interior Ministry and foreign security services.

According to a Bulgarian newspaper, the action took place in three main cities in Bulgaria — Bourgas, Plovdiv and the capital Sofia. A special forces team found anabolic steroids valued at more than 2 million USD in one of the factories, which was described as "a warehouse on the crossroads in the capital." The illegal workshop was open and contained expensive heavy equipment. Pieces of equipment were working at full steam. In the warehouse the prosecution found tablets and four types of testosterone. Five people, including a woman, entered custody on charges of participation in organized group and distribution of highly active substances under the law. The three youngest — 22 years old — were arrested during the bust in the warehouse, the other two were taken in handcuffs from their homes. The police did not know the detainees. The investigation declared they were "small fish," and probably employed by the ring-leader of an international channel for anabolics.

All together more then ten people were busted in the operation, and seven places where searched for manufacturing steroids. Two of these places turned out to be very big factories. DANS agents seized boxes and products worth more then 3 million euro for the export market, mainly to Turkey and Dubai. Some of the products were bogus packages from a Dutch pharmaceutical company. At first glance these products looked just like the real pharmaceuticals. We assume the prosecution meant Deca (yellowtop) from Organon Oss. This is the first ever action against anabolic steroids in Bulgaria of DANS.

Information from our Bulgarian source:

"Now regarding the 'famous' Bulgarian bust. First off all we had elections last Sunday for the new parliament and you know before any events like this the government is doing some PR actions for the people etc. Second all the major guys involved in UGL shit are on vacation at the resort next to me and they don't seem bothered at all. You do the math. Again the guy with the yacht is completely legal/he has a little dark background but he is clean-I know him for so many years. And I was totally surprised that he is involved in steroids but I'm doing my investigation right now. Also people in the 'know' are laughing at this bust with a 'factory' on the crossroads at our capital city of Sofia. Again there are no details, neither names only initials. So we'll need more time to see what actually happened if anything ever happened."

Another source that normally sends us samples stated:

"I can help with some info here from Bulgaria, people outside my country don't know how much fakes. We manage to take out on the market, products like generic pharm,bd,lyka labs,boka labs,GM and much more, all of them MADE IN BULGARIA."

PRICELIST (Dec 2005)

1 Naposim 5mg/t 100.000tab/3900,-euro (Terapia)
2 Anabol Tablets 100.000tab/5900,-euro (British Disp.)
3 Stanabol 10mg/t 10.000tab/1100,-euro (Body Research)
4 Parabol 25mg/t 10.000tab/1400,-euro (Body Research)
5 Primabolin 5mg/t 10.000tab/1700,-euro (Hubei)
6 Halotestox 5mg/t 10.000tab/1900,-euro (Hubei)
7 Somatropin 12 IU 100vials/2300,-euro (Pharm Chemical)
8 Corpormon 8 IU 100vials/1900,-euro (Nikken)
9 Viagra! (India) 100mg.t 1000tab/2250,-euro
10 Deca Norma 200mg/ml 1000vials/1200,-euro
11 Deca Hollandia 200mg/ml 1000vials/1400,-euro
12 Iran Hormone 250mg/ml 1000vials/1500,-euro
13 Testost.Depot 250mg/ml 1000vials/1600,-euro
14 Omnadren 250mg/ml 1000vials/1200,-euro
15 Sustanon Turkey 250mg/ml 1000vials/1200,-euro
16 Primobolan Turkey 100mg/ml 1000vials/1900,-euro
17 Primobolan Romania 100mg/ml 1000vials/1100,-euro
18 Nandrolone Prop. 100mg/10ml 100vials/1400,-euro
19 Androbolic 100mg/5ml 100vials/800,-euro

British Dragon Products:

20 Mastabol 100vials/1200,-euro
21 Trenabol 100vials/1500,-euro
22 Trenabol-Depot 100vials/1700,-euro
23 Trinabol 100vials/1700,-euro
24 Testabol 100vials/1000,-euro
25 Testabo-Depot 100vials/1200,-euro

We do NOT shipping.

All products must be 'pick up' in Bulgaria.
All prices are by 'pick up' in Bulgaria.

We are working only with dealers.
We can delivery all products on the market.

steroid_depot

The pricelist is from Steroid Depot that produced and sold all these counterfeited products. This pricelist is from the year 2005. We found it odd that the website was located in Turkey. Our source told us that someone from Turkey was involved and that the Bulgarian newspaper published that a great deal of the AAS was exported to Dubai and Turkey. When asked, he told us a major underground lab was located in Turkey. Thus, the production was not only counterfeited Turkish Primobolan-Sustanon and Anapolan (counterfeits of Turkish Anapolan flow the world for many many years) but also products made for this UG lab. Readers of our magazines and website know we analysed a few of the products from the 2005 pricelist like the Primobolan and the Body Research products. And if you take a close look at the pricelist you'll notice the claim, "we can deliver all products on the market". That explains the results from the Dutch research, when more than 60% of the "human grade" products on the Dutch market turned out to be counterfeits. We know that a part of these products were also meant for the German and Belgium market.

The source continues to explain:

"GM labs-I'm a good friend with the owner for years but never been to where they actually make their products but he was explaining me the whole process as what they do and what they don't. As a matter of fact he has probably the best gear (that's totally my opinion) with real ingredients and little overdosed and all of his competitors/powerlifters are taking it for competitions with great results.

But remember that I hate all the UGL stuff as long as HG is available and I don't try to promote anybody. Neither I have any hidden agenda like most of the people in this business. In Bulgaria steroid use is so widespread that every 13-15 old kid is trying to get on the gear. And they all ruining their health with fake stuff. 99% of the users in Bulgaria are using fake stuff/fake because a normal UGL will try to put up good products. But on the other end, in my

country they are trying to put on the market cheap products with virtually no ingredients or the worst ingredients possible. Not to mention the hygiene - it doesn't exist at all."

The action does not stand on its own. Additional seizures took place in short time span:

On January 6, 2009 customs officers at the Ljubljana airport seized a record 18 kilos of illegal anabolic steroids. Bottles of pills from P&B laboratories in India and sachets from Hubei Huangshi Nanshang Co in China

On June 29, 2009 two Bulgarian truck drivers were arrested with 23,000 doses of anabolic substances in Arad (Romania). Their truck was traveling from Bulgaria to Germany and Belgium, and was transporting appliances and other goods, according to its documentation. The Romanian customs officers in the northwest city of Arad, close to the border with Hungary, however, discovered 23,000 doses of testosterone in the body of the Bulgarian truck packed in cardboard.

On June 27, 2009 customs officers at the airport of Abu Dhabi foiled an attempt to smuggle 33,000 steroid injections — typically used by bodybuilders — into the country. Inspectors found a large quantity of a controlled hormonal drug in the form of injections that they said was intended for sale. The drugs, which were manufactured in Bulgaria, may have been counterfeit, according to health officials.

Spain — Operation Mammoth (April 2005)

In early 2005, Spanish authorities interrupted an enormous network that manufactured and distributed anabolic steroids on the black market in violation of European law. The action was named "Operation Mammoth." The name was very appropriate, as this would be the largest clandestine steroid manufacturing operation ever dismantled in Europe. It involved the execution of raids at 56 different locations in 13 separate Spanish provinces. A total of 70 people were arrested as part of this criminal organization. More than 30 million dosage units of EPO, anabolic steroids, and other performance-enhancing drugs were confiscated during the raids.

The Mammoth operation involved the cooperation of the Spanish Ministry of Health and Consumption, as well as different health councils in the independent communities involved in the raids. The performance-enhancing drugs produced by the group were sold throughout gyms and other training facilities in Spain, over the Internet, through retail outlets, and even directly to athletes. It was also quickly understood that this group distributed their products not only in Spain, but also throughout many areas of continental Europe, and to many other parts of the world as well. Authorities seized the doping drugs, and also extensive property, several luxury vehicles, and approximately $200,000 Euro in cash.

The Mammoth operation is striking not only for its size, but its makeup. The group used a total of six manufacturing locations to assemble their steroid products. Two of these facilities were actual licensed drug manufacturing laboratories, with a production capacity of up to 20,000 dosage units per hour. Here they had large pill presses, encapsulation machines, liquid filling equipment, mixing chambers, and precision scales at their disposal. The remaining four clandestine laboratories were located in private homes, an industrial ship, and a commercial building. The drugs were often stored in garages, cellars, and other houses specifically obtained for these illegal activities. In many cases, final production steps, such as placing the completed drug units into final counterfeit packaging, took place in these off-site locations.

The drugs that the Mammoth group produced took on a wide variety of different forms, including single use ampules, tablets in blister cards, and multi-dose injectable vials. Authorities describe the counterfeit products as being very high quality in appearance, and extremely difficult to differentiate from the genuine product. So much so, that they might be sold in the same pharmacies as the officially authorized drugs without knowing. This type of sophistication is becoming more and more common, as consumers become more educated about the existence of fake steroid products on the black market. Producers are forced to upgrade manufacturing capabilities, and those that do so most effectively (such as the Mammoth group) are better able to conceal the true nature of their products from buyers.

We believe we've encountered some of the Mammoth products before. Look at the photographs provided on the next page. The counterfeit Testex, which was supposedly manufactured by Altana in Spain, is believed to come from one of the Mammoth laboratories. We noticed a clear deviation upon close examination. The counterfeit ampule has the lot number (specifically the letter "T") exactly underneath the letter "L" from Altana. The real amp has the "V" from V 05 sitting before the lab name (Altana). We proved ourselves right with an analysis of the product. The Mammoth product was found to contain only inert oil, no steroids. Later, we also found counterfeit ampules with a gold instead of white break-ring around the neck. To an untrained observer, these ampules appear to be very professional, and would likely be assumed legitimate.



The real Testex ampule is on the left. The counterfeit ampule (right) is believed to have originated from a Mammoth lab.

Operation Raw Deal (2007)

In September 2007, Drug Enforcement Agency representatives announced the results of an 18-month investigation into the underground steroid market.



Inside view of an underground steroid manufacturing laboratory raided during Operation Raw Deal. Photos courtesy of DEA.

Dubbed Operation Raw Deal, it would be the largest U.S. enforcement action against the illegal steroid trade in history, surpassing even the extensive 2005 raids on the Mexican supply. Over a series of four days, law enforcement officials executed 143 federal search warrants, resulting in 124 arrests. A total of 56 individual underground steroid manufacturing labs were dismantled. The raids netted 11.4 million dosage units of steroids and other doping substances, 242 kilograms of raw steroid powder (enough to make many millions of additional dosage units), 6.5 million dollars in forfeited currency, 25 vehicles, 3 boats, 27 pill press machines, and 71 guns and other weapons.

Operation Raw Deal was a multi-agency operation. It involved the cooperation of the U.S. Drug Enforcement Administration (DEA), Food and Drug Administration's (FDA) Office of Criminal Investigations, U.S. Postal Service, Internal Revenue Service (IRS), U.S. Immigrations and Customs Enforcement (ICE), Federal Bureau of Investigation (FBI), and the National Drug Intelligence Center (NDIC). These agencies worked together with local police to serve the warrants and execute arrests over the 4-day series of raids. U.S. law enforcement also coordinated their efforts with law enforcement agencies from around the world, including Mexico, Canada, China, Belgium, Australia, Germany, Denmark, Sweden, and Thailand.

Federal authorities were greatly aided in their investigation by the cooperation of Hushmail.com, a popular free online service that allows members to send and receive encrypted emails. Many of those involved in the steroid trade had been using the service, relying on the private exchanges to protect their businesses from the preying eyes of law enforcement. This decision was the undoing of many, and provided a goldmine of information for investigators. Hushmail handed over volumes of documents on dozens of steroid suspects. It offered them an unprecedented look inside the illicit steroid business, stretching from the raw materials manufacturers in China, to dealers and end users in countries around the globe. The steroid business was so concentrated in Hushmail at



Product assembly table. The conditions in this lab are highly unsanitary.

the time, in fact, that it seems unlikely such a far-reaching series of linked arrests will ever be repeated.

It could be argued that due to stricter criminal laws, underground steroid manufacturing is even more clandestine in the United States than it is in other



Chemical and component storage locker.

countries. Unlike Operation Mammoth in Spain less than two years earlier, authorities did not uncover any licensed U.S. pharmaceutical laboratories that were manufacturing steroids "on the side" during the Raw Deal raids. Instead, they found an enormous network of small-scale dealers. The typical U.S. lab mixed and packaged their steroids in a private home located in a suburban neighborhood. The lab was usually found in a single room, such as a spare bedroom, basement, garage, or bathroom. The packaging was very simple, usually consisting of hand-filled multi-dose vials for the injectables. Blank capsules and tablets were typical for orals, which were placed in loose bottles. Authorities did not report finding any sophisticated ampule filling or blister packing equipment.

Federal agents described many of these makeshift labs as "extremely unsanitary." Photographs provided to the media by the DEA support this contention. In one set of photographs we see a vial filling table, one of the most crucial steps of assembly, sitting in what looks to be a very messy garage or unpainted dwelling home. What should be sterile manufacturing components (empty vials and tops) rest in exposed garbage cans in the middle of the room. Authorities further reported that in some of the underground steroid labs they raided, huge amounts of raw steroid materials were being mixed in actual bathtubs and sinks. When announcing the raids, DEA Administrator Karen P. Tandy stated, *"Today we reveal the truth behind the underground steroid market: dangerous drugs cooked up all too often in filthy conditions with no regard to safety, giving Americans who purchase them the ultimate raw deal."*

Federal authorities also identified as many as 37 manufacturers in China that were supplying the raw steroid powers to these clandestine labs. This information was passed along to Chinese officials for local follow up. As uncovered during a *New York Times* investigation into the Chinese manufacturers (see the API Trade section) shortly after Raw Deal, most of the companies that supplied American underground labs with their steroid materials were unlicensed chemical manufacturers, not pharmaceutical companies. In the months following the operation and lead-



Oils, other liquid components, and finished vials.

ing up to the 2008 Summer Olympics in China, the enforcement actions seemed to significantly diminish the production of raw steroids. Since this time, however, it appears that the Chinese market has resumed normal levels of production. It is unknown at this time if Raw Deal will have any lasting impact in the illegal supply of steroid raw materials.

3rd Party Lab Analysis Reports

Quality of Illegal Doping Substances in the Netherlands (2004)

This section pertains to a study performed in the Netherlands, which examined the quality of anabolic androgenic steroids and related substances used as performance enhancing drugs by athletes, bodybuilders, power lifters, fighters and an increasing amount of cosmetic bodybuilders. The aim of this study was to obtain a current and clear insight on the quality and availability of illegal doping agents on the Dutch black market.[37] Although isolated to steroids found in Holland, we think the results are quite representative for most European countries.

This study is especially interesting because it has the same interest and aim as this book. The Dutch study covers four years and involves the analyses performed on 203 products that were seized during the arrest of dealers or became available through other channels of the Dutch inspection for public health, during the period between 2000-2003. They were analyzed for the presence of active ingredients as claimed on the label. The study contains a total of 336 products that were analyzed. Beside the products from the period between 2000-2003, the NeCeDo study made a comparison with the results of 98 analyses from 1998 performed by the NIDDR (Netherlands Institute for Drugs and Doping Research in Utrecht). They completed the study with extra analyses to the quality on eight products that were bought on the Internet in the year 2004, and to the uniformity of ten counterfeits that required 27 analyses. The results are below:

Quality

The quality of doping substances that are illegally obtained is bad. At least 50-60% of the products analyzed did not contain what was declared on the label. Counterfeit products appear in all possible ways; other, comparable, substances are processed within the product, or too little or even too much of the labeled substance can be found. In 7% of the analyzed products, not even a trace of an active substance could be identified.

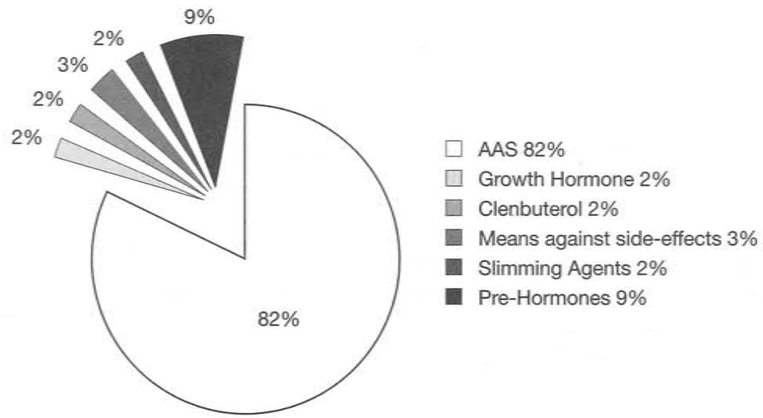
The Doping Market

The core of the black market in doping substances apparently has not changed over the last few years. Most of the substances used are anabolic steroids. In addition, substances are used to enhance the effects of AAS, such as growth hormone and insulin. New developments that have been identified are a larger acceptance of the use of both insulin and precursors of anabolic steroids, and a shift from amphetamines towards so-called "stackers" that contain ephedrine.

Doping substances originate from all over the world. Rising sources are countries from the Middle East (Iran, Iraq) and China. The Internet seems to be more of an informational source than an important source of actually acquiring these substances. There are some signs that a new kind of dealer is arising over the last few years, which is very different from the traditional dealer who often combines the sale of doping substances with advice on dietary and training issues. This new kind of dealer often has no direct link with gyms or fitness centers.

Table 1 gives an overview of the types of products that have been analyzed on the basis of the declared contents. It is broken down by drug type including androgenic-anabolic steroids or AAS (such as nandrolone, testosterone, stanozolol), growth hormone, clenbuterol, means against side effects (such as human choriongonadotrofine or HCG, tamoxifen, diuretics) and slimming agents (such as thyroid hormones, ephedrine). Also no amphetamines or erytropoëtine have been analyzed. This is because these products are only used sporadically still. Espe-

Table 1: kind of means that are analysed during the years 2000-2003 (n=203)



cially, the decrease in popularity of amphetamines is a remarkable change. Amphetamines were heavily used in the past on the Dutch market to slim, but this use has been replaced in previous years by products with the legal combination of caffeine, ephedra and aspirin, so-called ECA-stacks. Also, products that mostly contained ephedra or ephedrine hcl, were known as "stackers". These stackers are effective fat-loss products, but are cheaper and much less addictive than amphetamines, and have been sold for many years as dietary supplements. Since early 2004, in the Netherlands, and in a lot of other countries, most ephedra substances have been prohibited because these substances are believed to increase the risk of heart problems and haemorrhages in the brain.

Historical

The percentage of counterfeits is high, but lower than in earlier research. Koert & Van Kleij (1998) estimated the percentage counterfeits on 60-70%. Oldersma and colleague (2002) raised the maximum percentage up to 80%. The analyses carried out in this research from 2005 show another picture, with an average percentage of 57%. By using past results (the analyses carried out by the NIDDR), it is possible to look back in time. Given the results of these analyses, 50-60% is a more realistic estimation of the percentage of counterfeits.

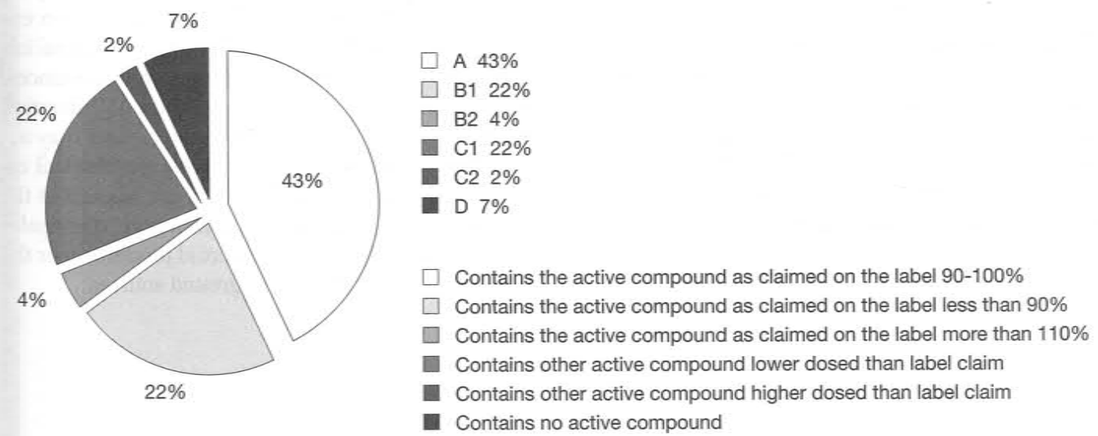
Year	% Counterfeit
2000	58%
2001	52%
2002	54%
2003	55%

The inspection for the health care (IGZ) found that in 24% of all cases, the product contained another, but similar substance than indicated on packing. Generally it was substituted with nandrolone or (methyl) testosterone instead of the declared anabolic steroids such as oxandrolone, trenbolone, or drostanolone. In two cases, the product contained human cadaveric growth hormone instead of synthetic somatotropin. The explanation for these permutations of ingredients speaks for itself. The used substances are much cheaper and easier to obtain than the substances that are claimed on the label. Commonly, the doses are much lower also.

To be able to make a historical comparison for this research, 98 analysis results from 1998 have been examined again. It concerns analyses which where carried out by the then NIDDR in Utrecht. THE NIDDR completed a lot of doping research in the nineties, among other things concerning the authenticity of doping resources. The way these samples where obtained, however, differed slightly from the way in which the IGZ obtains its samples. THE NIDDR got these samples from the tax information and detection service (FIOD), or by means of doctors who wanted the products to be analysed.

The percentage of products that effectively contained the declared active substance was similar between these two sources (73% compared with 69%). The percentage of products that contained another, similar substance, are by the NIDDR-results much lower (9% compared with 24%). Also, in 1998 this particularly concerned nandrolone and methyl testosterone substitution, whereas the number of products that contained no detectable quantity of active ingredients was markedly higher (17% compared with 7%). Although the products where obtained differently, and a real comparison therefore cannot be made, it seems that over the years, the black market has come to sell more products that do contain actual steroids. Because when the NIDDR-analyses where performed they made no quantification of the found substances, it is not possible to quantify the total number of counterfeits under those products. It is, however, clear that at least 31% were false. The quality of the products is extraordinarily difficult to predict.

Table 2: quality of the sized means (n=203)



Poison in a Package, USA (2005)

On November 6, 2005, the *Hartford Courant* newspaper published an article that examined the quality of anabolic steroids purchased over the Internet. For the article, the author had ordered 13 drug samples from three separate online dealers residing in Poland, Spain, and Moldova. Twelve of these samples were of popular anabolic steroids, and the remaining one was the beta-agonist (cutting drug) clenbuterol, which is also popular with bodybuilders. These samples were shipped to Northeast Laboratories in the United States for analysis. Northeast is an accredited analytical lab that does extensive pharmaceutical testing, and holds significant government contracts. They also hold a DEA license to test controlled substances such as anabolic steroids.

The results of this testing are listed below. The article described a problem that is very well known to those in the steroid community, namely that legitimate anabolic steroids are hard to come by. A review of the test results suggests that few, if any, of the tested samples were legitimate human-grade pharmaceutical products. Of the 12 steroid samples analyzed, all 12 were either underdosed, overdosed, or contained deviant drugs and/or impurities that would not be present in a true human grade pharmaceutical product. The sample of clenbuterol also deviated in dosage from the label claimed amount, although the exact dosage was not provided. While it is possible that one or two of these drugs was made in a legitimate pharmaceutical laboratory, it is unlikely they are anything other than underground and counterfeit pharmaceutical products.

The contaminants in some of these products were highly alarming. For example, the heavy metals lead, tin, and arsenic were found in some of these samples. These metals can accumulate in the body over time, leading to illness, even serious organ damage or cancer. A variety of non-steroid drugs were also identified in some of these products. For example, one contained diethylstilbestrol, which is a synthetic estrogenic once used by pregnant women to help prevent miscarriages. It was also used a growth promoter in cattle, until being removed from the market in the early 1970s after being linked to cancer. Another sample contained two corticosteroid drugs, which can actually inhibit protein synthesis and stimulate protein catabolism, opposite of the effects of anabolic steroids. A chemical used in the manufacture of plastics (furancarbocaldehyde) was found in another sample.

The insidious problem with these underground and counterfeit drugs is that all of them contained active anabolic steroids in sufficient dosages. As such, all are likely to produce muscle-building effects in the customers who use them. This makes identifying other problems with quality and contamination extremely difficult. Unless the user were to become immediately ill from one of these unlabeled substances, they are likely to use the drugs for the full duration without notice. Over time, the contaminants may accumulate, or begin to impart stronger biological effects. Anabolic steroid consumers are warned of the potential for such contamination (and related health risks) when buying anabolic steroid products over the Internet, or from other underground sources.

Product	Drug	Dosage	Actual Test Result
Poland			
1. Anabol	methandrostenolone	5 mg/tab	methyltestosterone, nandrolone
2. Deca-Durabolin	nandrolone decanoate	100 mg/mL	testosterone propionate
3. Sustanon 250	testosterone blend	250 mg/mL	testosterone propionate, testosterone, prednisone, betamethasone
4. Testosterone Enanthate	testosterone enanthate	250 mg/mL	testosterone enanthate (182.5 mg/mL), diethylstilbestrol
Moldova			
1. Anapolon	oxymetholone	50 mg/tab	oxymetholone (slightly higher dose) androstan-11-one, other steroids
2. Clenbuterol	clenbuterol	40 mcg/tab	clenbuterol (slightly lower dose)
3. Mastabol	drostanolone propionate	100 mg/mL	drostanolone prop. (120 mg/mL)
4. Testosterone Cyp.	Testosterone cypionate	200 mg/mL	testosterone cyp. (lower dose)
Spain			
1. Anabolic	boldenone undecyl.	100 mg/mL	nandrolone, testosterone propionate lead, benzyl chloride
2. Deca-Durabolin	nandrolone decanoate	200 mg/mL	testosterone propionate, other testosterone esters, androstenedione tin, arsenic
3. Sustanon 250	testosterone blend	250 mg/mL	testosterone enanthate
4. Winstrol	stanozolol	50 mg/tab	stanozolol (91 mg/tab)
5. Bionabol	methandrostenolone	5 mg/tab	methandrostenolone furancarbocaldehyde

ANABOLICS Underground Market Analysis, Europe (2007)

In an effort to help consumers assess the quality and potential health risks of underground steroid products, we spearheaded a detailed joint drug analysis project in April of 2007 for publication in the *ANABOLICS* book. This project focused solely on examining the quality of steroids made from underground facilities, and exceeded the normal scope of testing by examining variables often overlooked in simple dosage testing. A total of 14 underground steroid samples were selected for laboratory testing, ranging from small to large-scale underground operations. These names had not been previously released, and the results were presented blindly. The full list (names included) is being presented for publication here, for the first time. All 14 samples were analyzed at a registered and licensed testing facility in the United States.

There were four specific areas of testing for the 2007 market analysis project. The first test was to look for the presence of toxic heavy metals such as lead, tin, mercury, and arsenic. The metals tested all pose specific threats to health when they accumulate in the body. Those metals considered inert (such as iron and aluminum) were not included. Next, we commissioned the standard steroid quantification testing to see how these products were dosed. After this we looked to see if there were any unknown steroidal contaminants in the products. Pharmaceutical grade steroids should appear highly pure. Unprocessed intermediary chemicals or other contaminants should not appear upon analysis. The presence of unknown steroidal substances signifies that lower quality materials (not made to pharmaceutical standards) were used. Finally, we examined for the presence of the flavoring agent like 2,4-decadienal. This material is common to food products, and its presence demonstrates that food-grade oil (not highly pure pharmaceutical grade oil for injection) was used during product manufacture.

The specific results for each of the four testing sets are presented in the tables below. Overall, the products examined in this study reflected extremely poorly on the quality of the underground steroid market. To begin with, more than 20% of the products (1 in 5) contained heavy metal contamination. Next, an examination of basic drug dosing showed many deviations. Approximately 35% of the products were actually significantly overdosed. While this was likely done in an effort to produce a stronger user response and loyal customer base, this is unacceptable and does raise many potential safety issues. In the third set of tests, more than 60% of the samples were shown to contain some type of unidentified steroidal compound. This does not necessarily mean the products were dangerous, as this may simply consist of inert steroid precursors/intermediary compounds. It does, however, show very clearly that impure steroid materials were used during the manufacturing process. Lastly, finding 2,4-decadienal confirmed that at least 14% of the steroids tested used food grade oil, perhaps the type purchased in a grocery store.

Test #1: Heavy Metals Contamination

Laboratory	Drug	Contamination	Result
1. Nordic	methandrostenolone	None Detected (<0.002)	PASS
2. SWE	testosterone enanthate	None Detected (<0.002)	PASS
3. Microbiological	testosterone enanthate	None Detected (<0.002)	PASS
4. Microbiological	testosterone propionate	None Detected (<0.002)	PASS
5. British Dragon	boldenone undecylenate	Metals Found (>0.002)	FAIL
6. Diamond	testosterone cypionate	None Detected (<0.002)	PASS
7. Generic Anabolics	boldenone undecylenate	Metals Found (<0.002)	FAIL
8. Generic Anabolics	trenbolone hexahydro.	None Detected (<0.002)	PASS
9. Lizard Labs	testosterone cypionate	None Detected (<0.002)	PASS
10. Medical, Inc.	methenolone enanthate	Metals Found (>0.002)	FAIL
11. Shark Labs	testosterone cypionate	None Detected (<0.002)	PASS
12. Troy Labs	nandrolone decanoate	None Detected (<0.002)	PASS
13. Generic Pharma	methenolone enanthate	None Detected (<0.002)	PASS
14. Amplio Labs	trenbolone enanthate	None Detected (<0.002)	PASS

Failure Rate: 21%

Test #2: Dosage vs. Label Claim (mg/mL)

Laboratory	Sample	Labeled Dose	Actual Dose	Percentage	Pass-Fail
1. Nordic	methandrostenolone	25 mg	115 mg	459%	FAIL
2. SWE	testosterone enanthate	250 mg	440 mg	176%	FAIL
3. Microbiological	testosterone enanthate	250 mg	408 mg	163%	FAIL
4. Microbiological	testosterone propionate	75 mg	127 mg	169%	FAIL
5. British Dragon	boldenone undecylenate	200 mg	240 mg	120%	PASS
6. Diamond	testosterone cypionate	200 mg	204 mg	102%	PASS
7. Generic Anabolics	boldenone undecylenate	200 mg	178 mg	89%	PASS
8. Generic Anabolics	trenbolone hexahydro.	76 mg	190 mg	249%	FAIL
9. Lizard Labs	testosterone cypionate	200 mg	177 mg	88%	PASS
10. Medical, Inc.	methenolone enanthate	100 mg	54 mg	54%	FAIL
11. Shark Labs	testosterone cypionate	250 mg	171 mg	69%	FAIL
12. Troy Labs.	nandrolone decanoate	250 mg	228 mg	91%	PASS
13. Generic Pharma	methenolone enanthate	100 mg	78 mg	78%	FAIL
14. Amplio Labs	trenbolone enanthate	100 mg	0 mg	0%	FAIL

Failure Rate: 64% (+/- >20% of Label Claim)

Test #3: Steroidal Materials Purity

Laboratory	Sample	Contamination	Result
1. Nordic	methandrostenolone	None Detected	PASS
2. SWE	testosterone enanthate	None Detected	PASS
3. Microbiological	testosterone enanthate	Unknown Peak Detected	FAIL
4. Microbiological	testosterone propionate	None Detected	PASS
5. British Dragon	boldenone undecylenate	None Detected	PASS
6. Diamond	testosterone cypionate	Unknown Peak Detected	FAIL
7. Generic Anabolics	boldenone undecylenate	None Detected	PASS
8. Generic Anabolics	trenbolone hexahydro.	Unknown Peak Detected	FAIL
9. Lizard Labs.	testosterone cypionate	Unknown Peak Detected	FAIL
10. Medical, Inc.	methenolone enanthate	Unknown Peak Detected	FAIL
11. Shark Labs	testosterone cypionate	None Detected	PASS
12. Troy Labs	nandrolone decanoate	Unknown Peak Detected	FAIL
13. Generic Pharma	methenolone enanthate	Unknown Peak Detected	FAIL
14. Amplio Lab	trenbolone enanthate	Unknown Peak Detected	FAIL

Failure Rate: 57%

Test #4: Oil Purity

Laboratory	Sample	Contamination	Result
1. Nordic	methandrostenolone	2,4-Decadienal Detected	FAIL
2. SWE	testosterone enanthate	None Detected	PASS
3. Microbiological	testosterone enanthate	None Detected	PASS
4. Microbiological	testosterone propionate	None Detected	PASS
5. British Dragon	boldenone undecylenate	None Detected	PASS
6. Diamond	testosterone cypionate	None Detected	PASS
7. Generic Anabolics	boldenone undecylenate	None Detected	PASS
8. Generic Anabolics	trenbolone hexahydro.	None Detected	PASS
9. Lizard Labs	testosterone cypionate	None Detected	PASS
10. Medical, Inc.	methenolone enanthate	None Detected	PASS
11. Shark Labs	testosterone cypionate	None Detected	PASS
12. Troy Labs	nandrolone decanoate	None Detected	PASS
13. Generic Pharma	methenolone enanthate	2,4-Decadienal Detected	FAIL
14. Amplio Labs	trenbolone enanthate	None Detected	PASS

Failure Rate: 14%

Results

The scope of testing for this project was fairly limited, and fell well short of the detailed analysis required to validate a real prescription drug product. Still, the standards were rigid enough for a strong majority of the underground steroid products to fail testing. These drugs did not achieve a passing result due to a number of important purity concerns. The reasons included 1) they contained toxic heavy metals; 2) they were significantly under- or over-dosed; 3) they contained impure (not pharmaceutical grade) raw steroid materials; and/or 4) they were made with food-grade (not pharmaceutical grade) oil. It is important to remember is that this analysis project only covered 14 products, which is a very small number relative to the total number of underground steroid manufacturing operations and products in existence. It is possible that a different set of 14 samples would yield a considerably different set of results. Still, the very high failure rate seen during this investigation appears to underline several important purity concerns with underground steroid products.

Legitimate pharmaceutical products are manufactured under strict conditions for a reason. It is very difficult to maintain an acceptable level of purity without them. Even if the purest USP grade materials are being used, it can be very easy for a microscopic biological pathogen or other contaminant to enter a solution unless every single potential source of contamination is addressed. Underground manufacturers have little financial incentive (or often logistical possibility) to make their drugs according to these strict purity standards. Instead, a lower quality ("food grade") level of manufacturing may dominate the underground market. While the number of anecdotal reports of injury from underground steroid products appears to be relatively low overall, and admittedly a substantial dose of benzyl alcohol in solution will kill most biological contaminants, readers need to be aware that there remains a high likelihood of impurity with underground drugs. By the very nature of these products purity cannot be assured, and results like those of the *ANABOLICS Underground Market Analysis* only further highlight this.

German Market Study (2008)

Analysis reports of law enforcement seizures offer an occasional snapshot of the quality of steroid sales in a particular region. One such study was conducted at the Center for Preventative Doping Research in Cologne, Germany, and involved 70 different anabolic steroids and ancillary drug products.[24] All of the samples analyzed were obtained during police raids of three illegal dealers of anabolic steroids. It is important to emphasize that while the amount seized is a fairly large sample for this type of analysis, 70 drug products taken from three dealers is not sufficient to prove any specific market trend, overall counterfeit prevalence, or brand legitimacy.

Overall, more than one-third (34%) of the 50 anabolic steroids tested did not have ingredients that matched their labels, and were clearly made from illicit manufacturers. Of the failing products, nine were identified as copies of known pharmaceutical brands, and would be considered classic counterfeits. These made up 18% of the drug products in inventory by the arrested dealers. The remaining eight (16%) that failed were underground steroid products, which are discussed separately in this book. There were six additional products on the list that passed testing that were made by underground manufacturers (British Dragon, SB Labs, and International Pharmaceuticals). In total, legitimate drug companies did not manufacture 46% of the steroid products that were being sold by these dealers in Germany. The results are probably a good reflection of what is happening on the European market in general. Given the tighter legal controls on steroids in the United States, counterfeit and underground products are expected to make up an even higher percentage of products illegally sold in this market.

Visual Inspection

The researchers in Cologne, Germany also made an important observation. Aside from known underground products from labs such as British Dragon, SB Labs, and International Pharmaceuticals, they noted it was not possible to ascertain what product was real and what was a counterfeit upon visual inspection. While this group may not have had the experience or reference materials necessary to make an up-close product examination, and no product photos were provided in the report to reference, it does underline a problem that the steroid using community has been noticing for a long time, namely counterfeit manufacturing operations are becoming increasingly sophisticated. Now more than ever it can be difficult for someone shopping on the black market to determine product legitimacy before making a purchase and actually consuming the product(s).

The "Best" Products

Of the confiscated German products, those that were manufactured in Western Europe seemed to offer greater assurance of legitimacy than those of other regions. Thailand also remains a common source country for legitimate products not commonly manufactured in Western Europe including oxymetholone and methandrostenolone. This is in great contradiction to the United States, where regional products (United States and Canada) are those most likely to be the subject of counterfeiting. Also, the study showed that the less costly testosterone products were most likely to be legitimate, even if they originated outside of Europe. It appears that, at least by way of these three dealers, a good deal of legitimate Karachi Sustanon and Egyptian testosterone enanthate are being imported into Germany. It is of note that the one failure of CID enanthate was due to the inclusion of some testosterone cypionate in addition to the labeled enanthate. It is unknown if this was an error that occurred at the manufacturing plant, or the product was the subject of counterfeiting.

The "Worst" Products

Perhaps due to high recognition and demand, all of the Normal Hellas nandrolone decanoate products tested during this analysis run were determined to be counterfeit. These products were confiscated from each of the three dealers independently. In all cases, these steroid products contained testosterone instead of nandrolone decanoate. This is a common substitution with deviant nandrolone products, as low doses of testosterone can provide a similar level of anabolic effect as nandrolone for some users, with a similar low incidence of side effects. Testosterone is also much less expensive to manufacture in comparison to nandrolone decanoate. The hope is that many users will not be able to identify testosterone as the content. Norma Hellas Deca, therefore, remains a product of extremely high risk on the European and international markets. Great care should be taken to examine any product closely for the required security features (see *William Llewellyn's ANABOLICS 9th Ed.*).

Other Bodybuilding "Ancillary" Drugs

A total of 20 non-steroid drugs were also tested. All products that would be defined as common ancillary drugs including tamoxifen citrate (Nolvadex), clomiphene citrate (Clomid), thyroid hormone, caffeine, and yohimbine hcl turned out to be legitimate. This underlines the lower risk in these ancillary drug items, no doubt due to the lower financial incentive for counterfeiters to duplicate these cheap and easy-to-access pharmaceuticals. The only non-steroid drugs where there was some substitution noted were in the male sexual performance category, which constitute drugs such as Viagra and Cialis. In most of the individual cases the drugs did test out as labeled. When they did fail testing, however, it was usually for the substitution of active ingredients of the same drug family. Male sexual performance products are known to be an active area of counterfeiting, so care should be taken when purchasing these products from illicit channels as well.

STEROID ANALYSIS RESULTS	RESULT
Anadrol (oxymetholone):	
1. Oxytone 50 mg (SB Labs, Thailand)	PASS
2. Oxytone 50 mg (SB Labs, Thailand)	PASS
3. Oxytone 50 mg (SB Labs, Thailand)	PASS
Deca (nandrolone decanoate):	
1. Norma Hellas (100 mg/mL)	FAIL (testosterone)
2. Norma Hellas (100 mg/mL)	FAIL (testosterone)
3. Norma Hellas (100 mg/mL)	FAIL (testosterone)
4. Norma Hellas (100 mg/mL)	FAIL (testosterone)
5. Decabol 250 (British Dragon, Underground)	FAIL (testosterone)

STEROID ANALYSIS RESULTS	RESULT
Dianabol (methandrostenolone):	
1. Anabol 5 mg (British Dispensary, Thailand)	FAIL (methyltestosterone)
2. Anabol 5 mg (British Dispensary, Thailand)	PASS
3. Anabol 5 mg (British Dispensary, Thailand)	PASS
4. Danabol DS 10 mg (March, Thailand)	PASS
5. Danabol DS 10 mg (March, Thailand)	PASS
6. Naposim 5 mg (Terapia, Romania)	FAIL (methyltestosterone)
Equipoise (boldenone undecylenate):	
1. Boldabol 200 (British Dragon, Underground)	PASS
Halotestin (fluoxymesterone):	
1. Fluoxymesterone (IP, Underground)	PASS
Primobolan (methenolone enanthate):	
1. Primobol 100 (British Dragon, Underground)	FAIL (nandrolone,testosterone)
Proviron (mesterolone):	
1. Proviron 25 mg	PASS
Sustanon 250 (testosterone mix):	
1. Sustanon 250 (Karachi, Pakistan)	PASS
2. Sustanon 250 (Nile, Egypt)	FAIL (different testosterones)
3. Sustanon 250 (Nile, Egypt)	FAIL (different testosterones)
4. Sustanon 250 (Karachi, Pakistan)	PASS
5. Sustanon 250 (Karachi, Pakistan)	PASS
6. Sustanon 250 (Karachi, Pakistan)	PASS
7. Sustanon 250 (Karachi, Pakistan)	PASS

STEROID ANALYSIS RESULTS	RESULT
8. Sustanon 250 (Karachi, Pakistan)	PASS
9. Sustanon 250 (Karachi, Pakistan)	PASS
Testosterone Cypionate:	
1. Testex Prolongatum 125 (Q Pharma, Spain)	PASS
2. Testabol 200 (British Dragon, Underground)	FAIL (different testosterones)
Testosterone Enanthate:	
1. Testofort 250 mg/mL (Pliva, Pakistan)	PASS
2. Testosterone Depot 250 (Eifelfango, Germany)	PASS
3. Testosterone Depot 250 (Eifelfango, Germany)	PASS
4. Testoviron Depot 250 (Medipharm, Pakistan)	PASS
5. Testoviron Depot 250 (Medipharm, Pakistan)	PASS
6. Cidoteston 250 (CID, Egypt)	FAIL (includes T. cypionate)
7. Cidoteston 250 (CID, Egypt)	PASS
Testosterone Propionate:	
1. Testovis 100 mg/mL (SIT, Italy)	PASS
2. Testovis 100 mg/mL (SIT, Italy)	PASS
3. Testovis 100 mg/mL (SIT, Italy)	PASS
4. Testovis 100 mg/mL (SIT, Italy)	PASS
5. Testovis 100 mg/mL (SIT, Italy)	PASS
6. Testabol (British Dragon, Underground)	FAIL (different testosterones)

UK Market Report (2009)

In the spring of 2009, a study was released from the Centre for Sport and Exercise Research at Newman University (UK), which examined the prevalence of counterfeit performance enhancing drugs (PEDs).[39] To complete this study, the university worked in co-operation with the Drug Control Centre analytical lab at King's College in London. The study involves the analysis of mainly oral and injectable anabolic steroid products, but also several samples of recombinant human growth hormone (somatropin) and other ancillary and performance enhancing drugs. The testing was ordered in response to an increase in reports of injection-site abscesses by bodybuilders in the United Kingdom. While this series of testing took place in the United Kingdom, given the global nature of the steroid trade these days, it should hold strong relevancy to underground markets worldwide.

The Drugs

A total of 57 drugs were submitted for analysis as part of this report. Although the exact source of the drugs was not identified, it was stated that all were obtained from the black market. A total of 19 oral products were submitted. These consisted mainly of oral steroids such as methandrostenolone, oxymetholone, mesterolone, and stanozolol. In addition, there were several other non-steroid products sent for testing including clenbuterol, albuterol, ephedrine, clomiphene, furosemide, and levothyroxine. For the injectable products, a total of 38 were submitted for analysis. Again, these consisted mainly of traditional anabolic/androgenic steroids such as testosterone, nandrolone, methenolone, trenbolone, and boldenone.

The Testing Methods

The laboratory testing protocols used for this investigation were fairly basic. With regard to the active constituent, the lab focused only on determining if the listed drug was present in the product. There was no quantification of steroid dosage. As a result, we do not know if any of the products were over- or under-dosed. As per this testing, a product is considered counterfeit only if the drug listed on the label is not found. This, of course, presents a great limitation, as many counterfeiters will put the correct steroid in their products, just not in the correct amount. There was also a test for any bacteria content in the injectable products; however, the results for each were not provided, so we do not know which individual items were contaminated.

The most detailed part of the investigation seems to have been the acquisition of raw steroid powder samples for comparative analysis. In some cases, the researchers seem to have gone to great lengths to obtain the drugs from their original manufacturers. For example, samples of methenolone, methenolone enanthate, and mesterolone were obtained directly from Schering (makers of Primobolan and Proviron). Samples for nandrolone decanoate, nandrolone phenylpropionate, and Sustanon (various testosterone esters) came from Organon. Stanozolol was obtained from Sterling-Winthrop, and clostebol from Farmitalia. Their sample for methandrostenolone even came from Ciba, the very original marker of Dianabol, which has been off the market for decades now. While this does not hold much relevance to the results, I found it fairly interesting, and worth including.

Drug Testing Results

The full results have been provided for review. In going over the data, we see a few trends for these results. For one, the oral steroids were much more likely to contain the correct drug. A total of 11 oral steroids were tested, and of them only 3 (27%) contained deviant or no active ingredients. Of the 33 injectable anabolic steroids tested, a total of 15 (45%) were determined to be counterfeit. With regard to the 5 growth hormone products tested, 4 (80%) were counterfeit. As would be expected, the drugs with the lowest likelihood of being counterfeited were the non-steroid ancillary drugs, which are generally much more widely available, traded without the same legal controls, and known to generate the least profit for dealers.

Category	*Percent Counterfeit*
Oral Steroids	27%
Injectable Steroids	45%
Growth Hormone	80%
Anti-Estrogens	(none)
Beta Agonists (clenbuterol, albuterol)	(none)

Bacteria Testing Results

The bacteria testing results were also positive. Some of the injectable steroid samples were shown to contain common bacteria species that live on the skin. These are usually known as skin commensals, which refers to the fact that the host (human) benefits from the bacteria in a type of symbiotic relationship. Although not specifically identified, these skin commensals may include staphylococcus epidermidis, mycobacteria, propionibacterium, and corynebacteri. While normally beneficial or benign to humans, these skin bacteria can have a pathogenic (illness causing) effect in some cases when they penetrate the skin and enter the body. This is a common risk with sharing or reusing steroid vials or injection equipment, or using illegitimate steroids produced under less than sterile conditions.

ORAL DRUG TEST RESULTS (REAL AND COUNTERFEIT)

	Product Label	Product Claimed	Drug(s) Found
1	Clenbuterol (Spiropent)	Clenbuterol	correct
2	Salbutamol	Salbutamol	correct
3	Stanozolol	Stanozolol	none
4	Stanozolol	Stanozolol	Dihydrotestosterone
5	Methandienone	Methandienone	correct
6	Stanozolol	Stanozolol	correct
7	Oxymetholone	Oxymetholone	correct
8	Oxymetholone	Oxymetholone	correct
9	Methandienone	Methandienone	correct
10	Methandienone	Methandienone	correct
11	Stanozolol	Stanozolol	correct
12	Ephedrine	Ephedrine	correct
13	Furosemide	Furosemide	correct
14	Stanozolol	Stanozolol	Methyltestosterone, Caffeine
15	Ma Huang	ephedrine alkaloids	Ephedrine
16	Clomiphene citrate	Clomiphene	correct
17	Levothyroxine	Levothyroxine	Thyroxine
18	Clenbuterol	Clenbuterol	correct
19	Proviron	Mesterolone	correct

INJECTABLE DRUG TEST RESULTS (REAL)

	Product Label	Product Claimed	Drug(s) Found
1	Deca Durabolin	Nandrolone decanoate	correct
2	Deca Durabolin	Nandrolone decanoate	correct
3	Equipoise	Boldenone undecylenate	correct
4	Omnadren	4 ester T. blend	correct
5	Sustanon	4 ester T. blend	correct
6	Sustenon '250'	4 ester T. blend	correct
7	Sustenon '250'	4 ester T. blend	correct
8	Parabolan	Trenbolone acetate	correct
9	Primobolan depot	Methenolone enanthate	correct
10	Primobolan depot	Methenolone enanthate	correct
11	Stanazol	Stanozolol	correct
12	Testosterone enanthate	T. Enanthate	correct
13	Testosterone enanthate	T. Enanthate	correct
14	Testosterone enanthate	T. Enanthate	correct
15	Testosterone propionate	T. Propionate	correct
16	Trenbalone acitate	Trenbolone acetate	correct
17	Zambon (Winstrol depot)	Stanozolol	correct
18	Norditropin simplexx	Growth hormone	correct
19	Sachet www.821.in'tep'	T. Propionate	correct

INJECTABLE PROUCT DRUG TEST RESULTS (COUNTERFEIT/FAKE)

	Product Label	Product Claimed	Drug(s) Found
1	Boldenona 50	Boldenone undecylenate	T. Propionate
2	Nandrolone	Nandrolone decanoate	T. Enanthate
3	Primobolan depot	Methenolone enanthate	Nandrolone phenylpropionate
4	Sustanon	4 ester T. blend	Incorrect T. Blend (enanthate)
5	Trenbolone 80	Trenbolone enanthate	Trenbolone acetate
6	Unlabelled	Growth hormone	rhGH material (22 kda peak, only)
7	Sachet 821.in 'te3'	4 ester T. blend	T. prop, cyp. Deca.
8	Boldabol	Boldenone undecylenate	none
9	Boldebal-h	Boldenone undecylenate	none
10	Mastabol	Drostanolone dipropionate	none
11	Primobolan depot	Methenolone enanthate	none
12	Spectriol	T. Esters	none
13	Testabol depot	T. Cypionate	none
14	Testex elmu 250	T. Cypionate	none
15	Cypionax	T. Cypionate	none
16	Trenbol 75-r	Trenbolone acetate	none
17	Youth gh	Growth hormone	none
18	Somatotropin	Growth hormone	none
19	Norditropin simplexx	Growth hormone	none

Underground Steroid Manufacturing

Overview of Underground Laboratory Types

While there are a great deal of regulations controlling the sterile manufacture of drug products in places like the United States, Canada, and Western Europe, such regulations do not exist with underground labs operating because of prohibition laws. They are simply illegal operations, and by very nature must be hidden from the government to survive. With no oversight in place, the labs are left up to themselves to assure product quality. The only potential repercussion for releasing low quality products is lost income if consumers become aware of the practice. Very rarely are analytical reports published on black market steroids, making such public notification uncommon unless gross contamination is occurring.

Looking back at the detailed requirements for pharmaceutical manufacturing, it is important to consider the focus of underground labs. At the very core, they operate to make money by selling drugs on an illegal market. With no regulations, there is little incentive to invest the enormous money and time in GMP level production. It would sap profits. In fact, most labs assemble their products in nations with strict laws against unlicensed steroid manufacturing or sales. The smaller the lab is, generally the better. Nobody wants to build a big facility. Also, the incentive to invest in USP/BP/EU grade ingredients is low. In most cases, underground labs cannot even obtain these ingredients if they wanted them. At best, they may buy very high purity uncertified materials.

The following is a quick rundown of the varying types of underground steroid manufacture processes. Although there could be many distinctions, they are broken up into four different levels. The first two concern the manufacture of higher quality underground products. If an underground product were to be knowingly consumed, it would be presumably least dangerous to use a product made from a lab that operates in such a manner. The latter two examples represent lower quality procedures, and unfortunately, are all too common in the market of growing prohibition. Later in this book we will discuss the common contamination problems with underground steroid products in more detail.

Pharmaceutical Quality (Very Rare)

An extremely small percentage of underground labs have their steroids manufactured by contract at offshore pharmaceutical production facilities that are compliant with GMP (or similar) guidelines for aseptic processing. Note the term "compliant" is chosen carefully. There should be no registered manufacturers in the U.S., Canada, or Western Europe that are willing to make steroid products for underground labs. At best, there are a small number of pharmaceutical companies in Asia or Eastern Europe willing to make products for some of these labs under contract. These products would then need to be smuggled into Western nations. Given the issues with importing finished dosages, underground products with such an origin are especially rare in the United States.

Good Quality

The vast majority of all underground labs make their products by hand, in a house or small business. Some of these labs, however, do go to great lengths to try and assure product purity. First, they are diligent about their ingredients. Although perhaps they are not always made to USP standards, they are as pure as possible. Pre-production testing of raw materials is conducted on a frequent basis to make sure this remains the case. The lab would fill its products in as close to sterile conditions as possible without a true clean room. This would entail, at the very least, a two-pass filling system, which uses vacuum filtration to refine liquids down to .22 microns (this is a very fine

filter, and can be used to produce a very clean solution under the right conditions). Only pharmaceutical grade carriers and antimicrobial agents are used. An example of such a lab will be discussed later in this book.

Common Quality

A majority of small-run underground labs presumably make their injectable products in an even more simplistic manner than described above. To begin with, pharmaceutical ingredients of varying purity levels are obtained on the black market. Testing of these materials is infrequent unless there is an obvious problem. The raw powder is mixed in a glass bowl with sterile oil and antimicrobial agents purchased on the Internet (usually benzyl alcohol and benzyl benzoate). The oil is filtered by hand before being placed in the vials with the use of a syringe filter. A .45-micron filter is most common. A second pass through a .22-micron syringe filter may also be made. The filters are changed every 100 mL. The vial is sealed with a hand-crimping machine.

The greatest attempt at sterility in a lab like this is made by the inclusion of the anti-microbial agents and the use of syringe filters. When present in the correct quantities, a mix of benzyl alcohol and benzyl benzoate, or even a healthy dose of isopropyl alcohol, will control most biological contaminants. Syringe filters can work very well also. In spite of this, however, underground products made like this are still not considered to be pharmaceutical quality. In fact, given how open the process is, and the (likely) use of impure raw steroid materials, the consumer can still be presented with any of a number of potential problems. Issues such as painful injections, heavy metal contamination, and even abscess infection are not uncommon with products made by such an underground lab.

Low Quality

Some underground labs are even less focused on purity than the above. In fact, they will often make dangerous mistakes. To begin with, low quality (cheap) raw materials are purchased and introduced immediately into production. These ingredients are mixed in a bowl with oil that was purchased at the grocery store. This oil, at best, may have been heated before the mix in an attempt to make it sterile. The anti-microbial agents are mixed, and may consist of something as simple as low purity isopropyl alcohol. The solution may be poured through a coffee filter into another bowl for "filtering." It is then filled into vials, which are sealed with a hand-crimping machine. Very little attention is paid to sterility and contamination during this process, as the end focus is usually on the production of as much sellable product, with as little equipment, as possible.

Going Underground?

There was a time that bodybuilders and athletes in Europe, Canada, and the United States took for granted that Western pharmaceutical companies made their steroids. There were few concerns with purity. The days of easy access to certified pharmaceutical products, however, are no more. Underground labs dominate the U.S. market today, and as we can see, usually have methods of production far removed from the complexities of registered drug companies. Admittedly, dangerous reactions to underground products are not common. But serious reactions still do occur with some frequency, and are likely to increase as the supply chain is forced further underground by prohibition. It is, at the very least, important to consider the potential implications of using underground steroid products before making a decision to use them.

Inside an Underground Lab



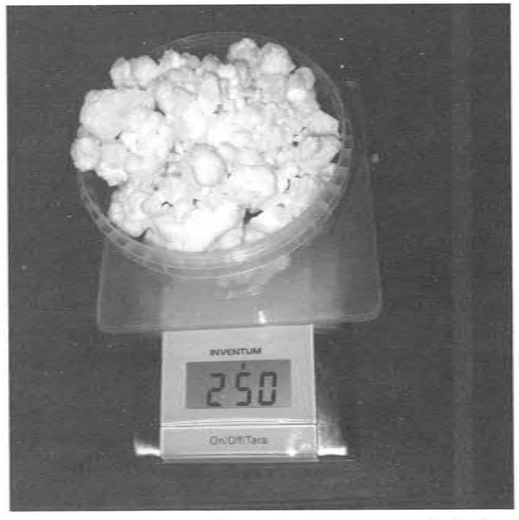
Product assembly table inside this underground laboratory.

In preparation for this book we were able to gain access to observe and document steroid manufacturing operations inside a European underground lab. As part of gaining access to this lab we agreed not to identify its name or any of the individuals involved. We also agreed to be vague about the total inventory and sales we noticed during our time with them. What we can say is this lab is fairly well known in Western Europe. It could be considered a mid-level operation, with much of the productions (as with many underground labs) done with small manual equipment in one or two rooms of a few private homes. A lab of this size is fairly typical in both Europe and the United States, and when running at full capacity can produce several hundred units of sellable product per day.

One chemist oversees all of the manufacturing for this lab, and handles all of the product formulations and blending. Two additional people work at the manufacturing facility part time. The more laborious and time-consuming tasks include filling and closing vials with manually operated equipment, necessitating the need for added help during active periods. The chemist of this lab was eager to share his process with us, and was very confident that, when followed closely and with clean raw materials, his procedures would consistently produce a clean, safe, and accurately dosed product. We watched the production of several injectable products very closely over a period of two days at this lab. We documented that the following steps were taken during each manufacturing run.

General Preparation

The manufacturing room is a small spare bedroom, meticulously cleaned with bleach. Rubber flooring has been installed to replace carpeting. Medium volume venting has been installed above the filling table, which pulls the air through 2 filters. All individuals that come into the room during filtering and vial filling wear a disposable cloth body suit with head cover to keep hair and other particles from contaminating the product. Facemasks and disposable latex gloves are also worn during these critical times. All pieces



Weighing out 250 grams of testosterone enanthate to start the batch.



A small amount of material might be heated to its melting point to check quality. In this case the melting point was verified during the mix.

of equipment that are not in sterile wrapping (such as small beakers, measuring cups, funnels) are stored in ethanol. All vials, stoppers, and tops are cleaned with ethanol and stored in airtight containers before filling.

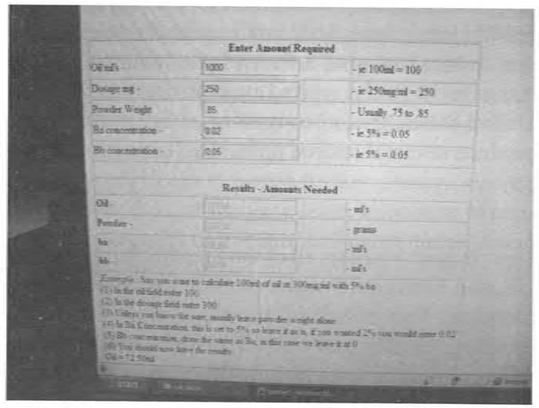
1: Melting Point Check

This lab occasionally tests its raw steroids for purity at an independent lab. To do this for each run would considerably slow the ability of the lab to produce. The chemist explains that over time they have established reliable sources for raw materials, and do not have many problems. They used to test very frequently, but have reduced random testing of the raw materials somewhat in recent months to expedite manufacturing. They do, however, still run a melting point check on all materials. This is useful because each steroid has its own specific melting point. A thermometer will allow the chemist to check that the steroid melts at the correct temperature. This step may be done separately as new material arrives, or early in the processing during the first mix and before pre-filtering.

Material Melting Points	*Celsius*	*Fahrenheit*
boldenone undecylenate	room temp	room temp
methandrostenolone	162-164	323-327
methenolone enanthate	66-71	150-160
nandrolone decanoate	30-35	86-95
nandrolone phenylprop.	92-96	197-205
stanozolol	228-242	442-468
testosterone	154-155	309-311
testosterone cypionate	98-104	208-219
testosterone enanthate	32-36	89.5-96.5
testosterone propionate	118-122	244-252
trenbolone acetate	94-97	201-207
trenbolone enanthate	72-78	161-172

2: Calculating

The injectable steroids at this lab are compounded in 1-liter (1000 ml) quantities. Before anything can be mixed the chemist must calculate the exact amount of each material needed. This generally includes the steroid, the oily carrier (in this case a blend of arachis oil and ethyl oleate), and antimicrobial agents (benzyl



A computer program is utilized to quickly calculate the amount of each material needed for the batch.

alcohol and benzyl benzoate). The chemist is assisted by a calculation program on his computer, which allows him to enter in the run size (1000ml) and dosage (250mg/ml), the percentage of BA and BB used, and the specific weight of the material. The program will output exactly how much carrier and anti-microbial agents will be needed to mix a 1000mL batch. These calculations can be done by hand but are time consuming.

3. Measuring and Blending

The raw steroid is placed in a pot, which rests on a portable heating source. The carrier and anti-microbial agents are measured with a graduated column. All materials are mixed together into the pot for blending.



Testosterone enanthate is mixed with oil, benzyl alcohol and benzyl benzoate.

4. Heating and Mixing

The heat is turned on. As the solution reaches the proper temperature, the solid steroid material will begin to melt and blend into the solution. The chemist will gently stir the solution by hand to facilitate the dissolving of the steroid. The temperature should not greatly exceed the melting point of the steroid. A thermometer is used to ensure the solution does not get too hot. Once the solution is completely mixed the heat source is immediately turned off. Temperature control is important, and helps minimize oxidation (damage) of the steroid.



The solution is heated and slowly mixed until completely dissolved.

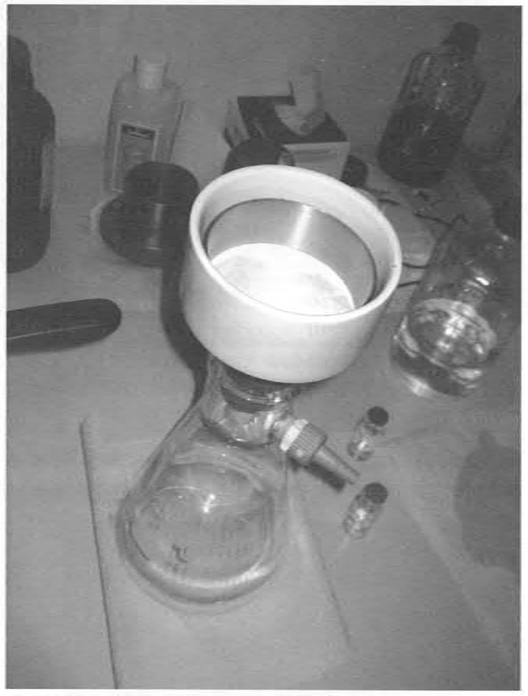
5. Pre-filtering Setup

A clean 1000ml glass container with vacuum hose attachment is setup on the table. A clean funnel is re-

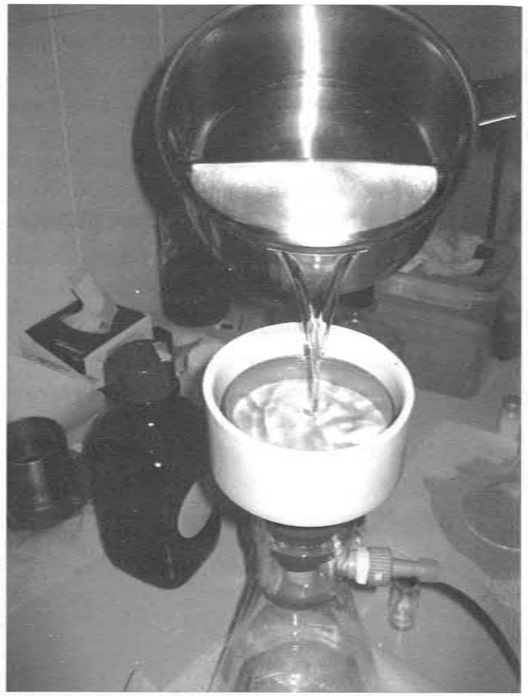


A new sterile .22-micron filter is opened for each run.

moved from storage in ethanol and inserted into container. A new .45-micron filter screen is placed at the base of the funnel. It is held down with a metal ring, which was also removed from ethanol storage. A hose is attached to the glass container, and at the other end to a small vacuum device.



Prefiltering setup. A .45 micron exposed filter is used to remove gross particulate contamination.

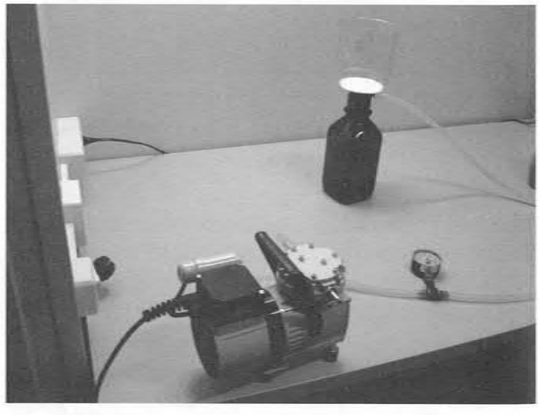


The solution is slowly added to the filter cup. Vacuum suction is applied to draw the solution through the filter and into the flask below.

6. Pre-filtering

The mixed steroid solution is slowly added to the funnel. Vacuum suction is added periodically to draw the solution through the .45-micron filter. Depending on the viscosity of the solution, this process can take 15 to 45 minutes or longer. Once completed, the pre-filter is discarded and the solution placed into a clean bottle for final filtering.

7. Final Filtering Setup

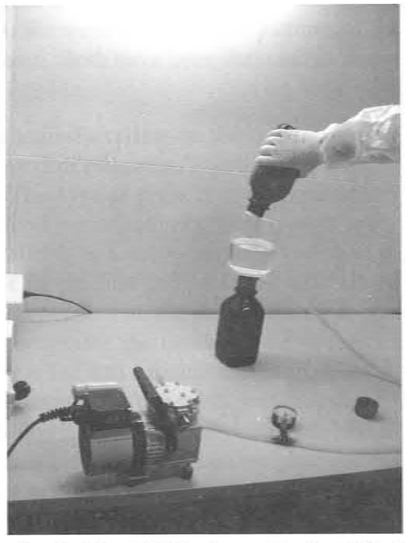


The disposable Nalgene filter is screwed onto the top of a 1 liter bottle. The vacuum suction hose is attached.

A clean 1000ml bottle is opened. A sterile Nalgene filtering system is removed from its packaging and screwed onto the empty bottle. This is a .22-micron vacuum assisted filter system very similar to the filter used during the pre-filtering, but much smaller and more thorough. A vacuum hose is attached.

8. Final Filtering

The pre-filtered steroid solution is poured into the Nalgene system. The top is closed, and vacuum suction applied periodically to draw the solution through the .22-micron filter. Once completed, the Nalgene filter system is discarded and the bottle is screwed shut until filling.



The pre-filtered solution (which has been transferred to a 1 liter bottle) is slowly added to the Nalgene filter cup.

9. Filling Setup

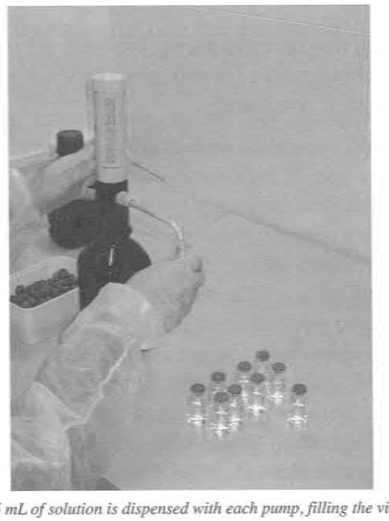
A manual pump is screwed onto the bottle. It will dispense a set volume of solution with each pump. In this case it is set to dispense 10.5 ml. The extra .5 ml is added because there is always some adhesion of the steroid solution to the walls and topper of the vial. Without adding the extra amount it would not be possible to use 10 ml.



After final filtering, a hand-pumped fluid dispenser replaces the Nalgene system on top of the 1 liter bottle.

10. Filling

Empty 10ml vials are held under the device by hand. With each pump of the device, a 10 ml vial is filled. Each full vial is placed on the table. A clean rubber stopper is immediately inserted into the vial. A second operator will often do this task.



10.5 mL of solution is dispensed with each pump, filling the vial.

11. Sealing

A top is placed over each vial stopper. With a manually operated crimping device, the tops are crimped around the vial. The product is now sealed and ready for labeling.

12. Labeling

The vials are labeled by hand and placed in boxes for transport. A third operator may do this when the lab is



The vials are sealed with the use of a hand-crimping device. Vials and rubber stoppers were sterilized in ethyl alcohol before filling.

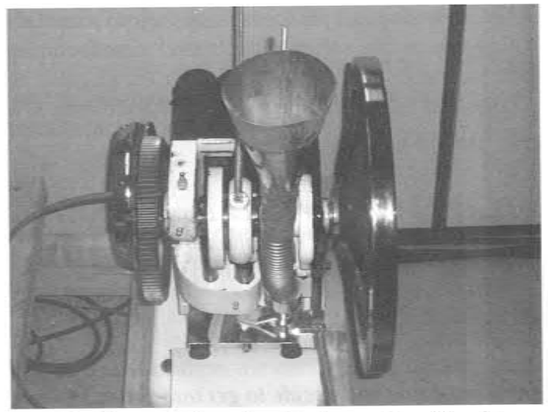
running at maximum capacity. We were not permitted to take photographs for this step. Product manufacturing is now complete.

Underground Tablet Manufacturing

We were unable to document the production of oral steroid tablets at the photographed underground laboratory. We were told this was due to a scheduling conflict, as they were not manufacturing any tablet products at the time we were invited to visit their operation. Their tablet production equipment also resides at another location, so we did not have direct access to it. We were told that due to the production of dust during the making of tablets, it was better to keep oral and injectable manufacturing operations separate from one another. The chemist for this underground company, however, did provide some information about the process they use to make their tablets. We were also afforded pictures of the equipment used. Both have been included in this section.

Tablet manufacturing on the underground requires some form of pill press. This lab uses a small electric press. This type of press is very common among underground manufacturers, as it is both portable and automatic. It is a very simple device, and the accuracy of its product (arguably, as with all tablets) is highly dependent on the skill of the press operator. In order to operate the machine, the pre-mixed tablet powder is fed into a funnel at the top. A small electric motor operates the dye press, and drops tablets one at a time down the front exit chute and into a waiting collection bin. These are then weighed and bottled accordingly. It is up to the operator to ensure that the powder constantly flows into the dye cavity, and that under all conditions (cold, warm, hot) the fill volume remains constant. This is the only way to ensure the dosage will be correct from one pill to the next.

To make the tablet mix, the steroid raw powder is first blended with powdered tablet binders and fillers. This is done in a moderate sized plastic container with lid. The powders are first mixed inside this plastic container by hand. Next, the lid is replaced, and the powder is shaken vigorously for homogeneity. The lab area and equipment are kept clean by manually wiping down exposed surfaces with an ethanol-soaked cloth. This is done more to ensure the manufacture of a clean and aesthetically pleasing product, than to



A portable tablet press. This type of machine is commonly used by underground laboratories.

protect the consumer from serious bacterial contamination issues. Tablet production is a dry process, and because of this is much less open to bacterial contamination in comparison to injectable steroid production.

Smaller underground labs that are unable to acquire a pill press usually do one of three things. First, they may simply avoid producing oral steroids. You will find that many underground labs manufacture injectable products in multi-dose vials only. This is simply because the multi-dose vial is the easiest to assemble in a private underground environment. At its most crude, this requires only a hand-operated vial top crimper and a supply of empty containers. Second, the lab may buy steroid tablets in bulk from another supplier, and place them in their own bottles. Lastly, the underground lab operators may choose to fill capsules instead of using hard tablets. Because of the robust dietary supplement industry, there are many small-scale capsule-filling machines available to purchase. At its most basic, capsule filling can also be done with a cheap and small hand-held filling tray.

Interview with an Underground Chemist

After reviewing and photographing various manufacturing runs at this secret underground manufacturing lab, we were able to sit down with the chemist in charge and ask a few questions. The following is a transcript of our interview.

Q: Let's start with the basics. How long have you been an underground manufacturer?

A: I think it started in 1999.

Q: What made you decide to get into the business?

A: Friends asked me how to manufacture oily solutions. I helped them, dug into it, started to experiment when I was unable to solve certain problems theoretically. I saw people in that UG lab earning big amounts of money without any risk or knowledge. They started to buy big cars etc. I knew I could do it better and started with a few friends our own lab.

Q: How did you learn all the things you know about manufacturing? Do you have a chemistry background?

A: Yes, but as you know yourself that has only limited advantage. This is a very specialized field. There is an enormous amount of information/scientific research available. That's why I admire people like Patrick Arnold that spend years reading all the old scientific material from the sixties, when giant pharmaceutical companies and scientists thought that steroids where the fountain of youth. It is not necessary to reinvent the wheel again. It's there already.

Q: How would you classify your operation? Big, small, medium-size?

A: I scale it small.

Q: Tell us about the manufacturing room we saw. Was it expensive to build? Difficult?

A: I used materials that attract less dust. I created a system that sucked the air above the manufacturing area through a double carbon filter and blows the clean air through an last filter just above the floor. On the side of the table I have an air cleaner that also cleans the side air through seven carbon filters. Then I use an ionizer that makes leftover airborne particles sink down to the surface.

Q: I noticed that there are many manual steps in your process. Do you have plans to expand your business with bigger automatic equipment?

A: When I'm extremely busy it crosses my mind sometimes. But then I would be forced to become professional. Now we have two different manufacturing locations to make sure we will be able to produce when one location is shut down. Plus we are small enough to be left in peace.

Q: You told me before that you always use quality materials to make your steroids. How do you know they are good?

A: I have extremely good contacts and I use only the best powder suppliers. They are more expensive, but are worth it. The oils, solvents, and preservatives are all pharmaceutical certified as I have shown you.

Q: Have you ever been sold bad materials? What were the worst things you've seen?

A: I work for other labs when they have difficulties with recipes, powders etc. One of my friends who runs a famous lab got powders just after the Chinese crackdown that where heavily cut with dangerous compounds. One of my best friends sent it in for analysis and the lab came to the conclusion that the gelled part of the solution consisted of polymers.

Q: How do you feel about the sterility of your product? I notice you are very clean, but your room is not quite a pharmaceutical room. Do you ever have problems with dust or contamination?

A: No, and I hope we never will, when we get complaints it is always about painful injections due to high concentrations. Most labs I work with have solved their problems. I'm convinced the end-user will not get an infection or abscess when he uses our product for the first time. The big question is how do they clean the injection place, store the pinched vial, needle, or syringe? You and I know many aggressive bacteria live on our skin, and when one gets into our system by injection, especially when the compound is water based, then you're fucked.

Q: Do you ever use your own products?

A: I only use my own gear or Human Grade that I bought myself. There are many counterfeits, as you know.

Q: What are your most popular steroids?

A: Testosterone Decanoate and Nandrolone Decanoate. This is the most ideal base to run a cycle with, it has a steady level without the many peaks of short esterified compounds and even Sustanon has. I always use a tablet with it to tickle the liver (IGF release) and then I prefer oxandrolone.

Q: What about the more expensive steroids, like trenbolone and methenolone. Do you think they are easy steroids to find on the black market? Are they often substituted for cheaper steroids? What, if anything, have you seen?

A: Methenolone and trenbolone are mostly replaced by nandrolone. My experience is that mostly even boldenone gets substituted by nandrolone as well.

Q: How do you feel about the quality of the underground market in general? Are most of your competitors clean? Have you seen any problems with dirty steroids?

A: I know lots of them use coffee filters or don't even trouble to filter.

Q: In your experience, do you think there many large underground labs with automated processes? Or is much of the work done similar to your lab operation, with manual filling and sealing?

A: Sure that is something I've noticed the last two years. Those companies are real pharmaceutical quality but produce products for the bodybuilder. Though I've witnessed the change from the small group of bodybuilders to the up and coming use of young people. Look at the movies — all those guys are pumped up, just like artists; hip-hoppers; the gay community; athletes, etc. — it has become big business worth millions. I'm an insider and noticed that the criminals took an interest in this business and use violence –intimidations, etc. to take over UG labs and websites. They changed business from hard drugs – recreational drugs like cocaine and heroin — to the more lucrative AAS market, mostly combining the businesses. And I believe the more countries take over this U.S. "war on drugs" the more this will increase. People will buy steroids no matter what, only prices will go up and quality will go down.

Q: You work in an illegal business. Do you think you are in a dangerous business? Do you fear being closed down by the law? Prison? Your safety from other dealers?

A: Its something you should consider, of course. But we took our precautions.

Q: What about the big international crackdown called Operation Raw Deal, where many suppliers were arrested, and the Chinese powder trade exposed. Did this affect your business? How?

A: Big time. You saw that it became difficult to obtain the raws, many labs could not get powders or could only get the basics (that problem is still valid). I know a guy in a big international steroid organization and he warned me this was coming. So we stocked raws especially the "specials." A lot of UG labs started to sell underdosed/mislabeled products. Things are changing and are getting normal again. Some labs found markets outside China.

Q: We've seen a lot of changes in the global market over the last several years. Where do you see the steroid market in 2 years? How about 5 or 10 years? Will it get better? Worse?

A: The use will increase, everybody wants a lean muscular body, both male as well as female. The sales will increase massively and the modern trend of bigger organizations in exotic countries that sell pharmaceutical grade AAS in a "legal" way. Criminals will try to obtain those labs or start them. I personally know some. If you only look to the busts where the police finds multiple guns and even machineguns, that should warn authorities, but they are as blind as ever.

Q: What do you think of the laws that make steroid use and sales illegal in many countries? Do you agree with them? Do you see them spreading?

A: That is what I stated in previous questions. It will become a very lucrative market and that will attract scumbags and criminal organizations. Remember the hippies in the early seventies, selling Moroccan weed where the seeds exploded in your pipe? The soft quality of home grown marijuana? And now its big business. The USA and other countries restricted the sales/use, but did that really help? The Netherlands allows free sale but are afraid to regulate the grow, because they are afraid that other countries will point to them as being the European Colombia. Nonsense, now the growth of marijuana is for the biggest part done by criminal organizations that use this profit for other illegal activities.

Q: Tell me about your customers. Do you mainly sell to dealers or to users?

A: I started making liters for the big guys — the powerlifters and strongmen in Scandinavia. I made special blends, high dosed compounds. I loved doing that. Now we still produce for other labs. The profit is good and it creates less work. As you saw the sterilizing, filtering, and filling of the vials is very time consuming. For the rest we only sell to resellers, we don't sell ourselves.

Q: Do you ever do business with Americans? Do you think it is safe?

A: As I said I have very good contacts and found out about this DEA plan in a very early stage. The DEA Austria started it. When we heard that the DEA wanted to ask for extradition we decided not to send to the USA. What our distributors do we don't know, of course.

Q: Do you have a lot of contact with the people that use your products? Would you say your line has a good reputation? Do you get a lot of repeat business?

A: Yes, most of them were friends or became friends. Some train athletes. We also sponsored some. And most of them get much feedback and let us know. I can say we have a very good reputation. We also have good reviews on bodybuilding message and discussion boards If we would choose to advertise, start a selling website, we would be forced to go professional. In the present situation I hardly have time for a social life. The demand for our products is many times higher then we are willing to produce. As my friend always says: small sips make you drunk eventually also!

Q: You must know many bodybuilders. Do you see a lot of health problems from steroids? Does the safety of steroids concern you, personally?

A: I truly believe that the use is only safe, it's the abuse that kills. Some people don't realize that modest amounts of steroids and a healthy life style bring the same results as enormous amounts of all kinds of steroids, peptides, ancillaries — it only takes a little bit longer. I always compare it with booze; if you drink a few beers it won't kill you or make you sick. If, on the other hand, you drink two liters of whiskey per day and eat bad, year after year, it will eventually destroy you. That is use and abuse. It does not mean that they are bad. It is how you use them. In the USA it's the fast food. If you teach your children to eat some fast food now and then and enjoy it, they can stay lean and healthy. If on the other hand you teach them to live on junk food they will end up obese or even worse — obese and diabetic.

Q: Is there anything you'd like to tell our readers? Words of advice when using steroids? Buying from underground labs?

A: Stay safe. Use low doses, don't combine with recreational drugs like "speed," cocaine, or XTC, not even in the weekend — the combination is dangerous. Remember this sport was once about a healthy lifestyle, which includes training, eating the right foods, getting enough sleep, and some optional chemical aids. This will make you as healthy and strong as you look. Most top bodybuilders feel dead sick when they compete in top shape: believe me, I know.

Understanding Filtration

A filter is a porous devise used for removing small particles from liquids or gases. At its most essential, were talking about a flat material with tiny holes in it. The smaller the holes are, the smaller a particle has to be to pass through them. It may seem simple, but filtration is a crucial modern technology that has changed the path of human existence. It protects us from infection by microorganisms, and has allowed humans to populate remote areas otherwise untenable. I think we would all be hard pressed to find someone that is not affected every day by filtration. Our homes, offices, and automobiles filter the air we breathe. And barring raindrops or swimming in natural waters, water never touches our lips unless it has passed some type of filtration along the way. Filtration is, of course, considered no less fundamental to the manufacture of injectable anabolic steroids. All but the most irresponsible of underground manufacturers will conduct some form of filtration on their products.

In the realm of underground steroid manufacturing, filtration often means a portable (disposable) filter-



Several .22 and .45 micron syringe filters

ing with something such as the Nalgene system, shown earlier. This uses vacuum suction to draw an oily solution through a .45-micron or .22-micron filter membrane, the same pour (micropour) sizes commonly used in drug manufacturing. This type of sys-



The use of a syringe filter to fill a vial. The filter provides added resistance, and usually requires a lot of added hand pressure to clear.

tem can filter a fairly high volume of liquid in a short window of time, enough that it is viable in a commercial sense for even some of the larger underground operations. Alternatively, the smaller underground labs tend to use .22 and .45 micron filters that attach to a syringe ("syringe filters"). Many cautious consumers of underground steroids will also re-filter their products with syringe filters before use. The practice of filtration is, of course, highly advised at any level of use. It is important, however, to understand the limitations of filtration as well.

The .22-Micron Standard

As part of the aseptic processing procedures that ensure the production of sterile drug products, FDA standards call for the filtration of all particles larger than .22-micron. For the sake of measurement, one micron is equal to .0004 inches. A micropour size of .22-microns is extremely small, and allows for the removal of almost all forms of bacteria. A filter of .45-micron is actually sufficient to remove a majority of bacteria as well, and was the pharmaceutical standard

for sterile drug production until the end of the 1960s. Certain small forms of bacteria such as Pseudomonas diminuta were shown to still pass through this filter, however, ushering in usage of the .22-micron standard. While extremely efficient at removing bacteria, even a .22-micron filter is not capable of complete filtration.

Limitations of Microfiltration

The filtering of injectable anabolic steroid products takes place at a level known as microfiltration. The pour sizes in the microfiltration range measure between .1 microns and 10 microns, although .22-micron to .45-micron are typically used for steroid solutions. While this range is highly efficient for liquid filtration, there are still many forms of organic and inorganic matter that may pass through these holes. The following is a list of potential contaminants that might still remain in a steroid solution, even after passing through a .22-micron membrane filter. This list of potentially unfilterable contaminants underlies how important steroid raw material purity is to the manufacture of safe steroid products.

Diminutive Bacteria: Although not commonly encountered, there are certain forms of bacteria (such as Burkholderia pickettii and Pseudomonas cepacia) small enough to pass through a .22-micron filter. Also, a problem known as "bacteria growthrough" can occur with many other larger bacterium if a filter is used for too long. Here, the replicating bacteria actually grow through the pours in the membrane. Microfiltration is still considered essential for sterilizing steroid solutions. It will, however, not sterilize under all circumstances.

Heavy Metals: Metal ions are small enough to readily pass through a .22-micron filter. Microfiltration cannot be relied upon to remove heavy metal contamination from a steroid product.

Drugs: If a solutiuon is contaminated with other pharmaceutical compounds, microfiltration will not remove them.

Synthetic Dyes: Virtually all forms of synthetic dye are small enough to pass through microfiltration.

Pesticides/Herbicides: Virtually all pesticide and herbicide chemicals are small enough to pass microfiltration.

Endotoxins: Endotoxins are toxic substances contained inside bacteria. These toxins are released when the cell disintegrates, and can be responsible for certain forms of illness (such as botulism poisoning).

Pyrogens: Pyrogens are another form of toxic substance released from bacteria. Pyrogens are responsible for causing fever. Pyrogens will readily pass microfiltration.

Viruses: All strains of virus are small enough to pass through microfiltration.

Tobacco Smoke: A large portion of tobacco smoke (and the chemicals contained therein) is small enough to pass through a .22-micron filter.

Common Problems with Underground Products (Injectable)

The body's defenses are largely bypassed with injection. This is extremely important to consider because injectable drugs present the highest acute risk when it relates to product contamination. Indeed, there are a great number of potential contaminants that could find their way into an injectable steroid that can result in harm to the user. This section details some of the most common problems associated with the manufacture of underground anabolic steroids.

Inaccurate Dosing

Very often, the dosage of a steroid product will deviate substantially from that which is listed on the label. There are many reasons for this. In some cases, impure steroid materials are used. Here, the dosage per tablet or milliliter of solution will be reduced in direct relation to the purity. In other cases, the deviant dosing may be intentional. Some underground manufactures may be using less material, so that their products are most cost effective (and profitable). Others intentionally exceed the labeled dosage hoping their lab will earn a reputation among buyers for producing "good" products. Inaccurate dosing is never a desired aspect of a pharmaceutical product. In the case of anabolic steroids, this problem can be especially troubling for most users, whom (unlike users of traditional narcotics) try to carefully plan their dosages and relative health risks.

Substitute Ingredients

Common in underground manufacturing is the substitution of expensive raw materials with cheaper ones. The raw material and dosage used is often something with a qualitatively similar effect to what is listed on the label, so that the customer is unaware of the substitution. For example, a low dosage of testosterone is very often used to mimic the "dry" (low water-retaining) effect of nandrolone or methenolone, two anabolic steroids that are significantly more expensive to produce.

Bacterial Contamination

In spite of antimicrobial agents and attempts at cleanliness, bacteria can be very insidious at infiltrating products made in sub-pharmaceutical conditions. Bacteria that have grown inside an injectable solution can potentially cause many serious health problems for the user. Common issues include injection site redness and pain, infection, or even abscess infection that requires draining or other surgical intervention. In more serious instances, bacteria contaminated product might even lead to severe permanent tissue damage, amputation, or death. Water-based steroids are more prone to bacteria problems, as this is a highly favorable medium for its growth (although problems are frequently reported with both oil- and water-based solutions). Although bacteria usually can't be seen upon visual inspection, take care to make sure all vials are strongly sealed with clean crimping.



This crimping on this product is poor, which may lend itself open to contamination from the outside air.

Heavy Metal Contamination

Pharmaceutical grade materials should be free of contamination by heavy metals such as lead, mercury, and arsenic. Sometimes these materials may enter the steroid powder during the production process. This often occurs from the use of metal containers for synthesis instead of glass-lined ones, or the use of regular tap water instead of de-mineralized water. These metals then end up contaminating the powder sold on the black market. Although the total heavy metal contamination is usually low, and is regarded as a result of poor processing and not purposeful adulteration, it can still be an important concern. Over time, exposure to these metals can create many serious health problems. This risk, of course, would be amplified with regular repeat exposure to impure steroid products. It is especially important that regular steroid users are aware of the potential for heavy metal poisoning with contaminated underground steroids.

Poor Filtering

Even when your materials are very pure, filtering is important. Given that the underground market trades in uncertified materials, however, a thorough process of double filtering is even more important. Failure to do this may lead to contamination of the final solution. A .45-micron filter is usually considered "prefiltering," and is not acceptable for full filtering unless the materials are USP grade and the processing aseptic. The final product in any underground lab should always pass through a .22-micron filter before being sealed. In some cases, however, this is not done, as it is much slower than .45-micron filtration. Never use any steroid product that has visible particulate floating in the solution. Also, be aware that many small particles from metal ions to tobacco smoke may pass even an ultra-fine filter. Filtering is only part of an acceptable manufacturing process, and is never a substitute for the purchase of pure materials.

Floaters

Floaters are contaminants (particles) in a steroid solution that are visible to the naked eye. This is a clear sign there is something wrong with a product. Many people believe that only gross lack of filtering could produce floaters. This is not actually true. While in many cases incomplete filtering is the problem, very small particles that pass through an ultra fine .22-micron filter may still cause visible contamination. This can happen if these fine contaminants have an affinity for one another in the solution. Over time they can aggregate into small visible specs, even though they were invisible during mixing. Again, this is a further reminder that pure steroid materials should be the starting point of all production.

Crystallization (oversaturation)

If too much steroid is added for the capacity for a given oily solution, it will become oversaturated. This simply means the oil can't hold the entire amount of hormone. The problem usually occurs due to temperature differences. As the temperature of oil increases, it expands, increasing its capacity to dissolve a soluble steroid. The mixing of a steroid solution is done under heat, and the solution may remain warm while



This testosterone cypionate from Geneza is over saturated. At room temperature crystals precipitate and fall to the bottom of the vial.

the underground lab processes it through filtering and vial filling. When finally resting, the extra steroid, which now can't all be dissolved at room temperature, will fall out of solution. In some instances a lab will oversaturate certain steroid products on purpose. International Pharmaceuticals, for example, received a great deal of positive attention during the early 1990s for oversaturating their testosterone cypionate. Provided the oversaturation is minor, submerging the vial in warm water may allow the steroid to become re-dissolved.



The unlabeled vial of testosterone on the right contains excess water. It can be noticed by shaking it.

Water Content (oils)

Some low-grade oil-based steroids from underground labs will be made with materials or processes that allow water into their finished products. Small amounts of excess water in oil-based solutions might be of no consequence at all, or it might breed bacteria. Whether benign or not, excess water in an oil-based steroid is clear sign that something is wrong. Common sources for excess water include low quality raw steroid materials, poor atmospheric control during bottling or material storage, and low quality antimicrobial agents. Some labs, for example, have difficulties obtaining pharmaceutical grade benzyl alcohol and benzyl benzoate, and instead use a low quality isopropyl alcohol that carries some water content. Significant excess water can be noticed by shaking the vial to look for cloudiness.

Low Quality Oil

Pharmaceutical grade oil is sterile and usually thinner than food grade oil. It should always be used to manufacture injectable steroids. In some cases, however, the underground lab does not have ready access to such materials, and will substitute it for oil purchased in the grocery store. There can be many problems with using low-grade oil like this. For one, this oil is generally much more viscous (thicker) than pharmaceutical grade oil, and therefore more difficult to both mix with and inject. In some cases the oil may also be significantly more painful to use. It may also be contaminated with dirt, bacteria, other particles, or even things such as flavoring agents that are not meant for injection.

Low pH

Sometimes certain underground products are particularly painful to inject. This can be caused by any number of things, although one common factor is the acidic nature (pH) of the solution. An ideal pH is generally between 4 and 7. Solutions with a pH lower than 4 are considered too acidic, which may cause significant irritation in the muscle tissues at the site of injection. In many cases, low or high pH is caused by an unbalanced mixture of liquid ingredients (solvents/cosolvents).

High Alcohol Content

Too much benzyl alcohol is a common cause for a steroid product which can be especially painful. Sometimes an underground lab will make this mistake because of simple human error. The operator may not know exactly how much is needed, and is using too high a percentage. In other instances, a higher alcohol content may be used on purpose. For example, some underground labs like to create unusually high dosages of steroids. Extra alcohol may be used in such cases to thin the solution and allow more steroid to be dissolved. In other cases, the higher alcohol content may be an attempt at compensation for the lack of proper filtration or attention to cleanliness. Whatever the cause, too much alcohol can be more than simply painful. It is unnecessary, and can kill local tissues, causing internal scaring and other permanent damage.



This vial of trenbolone has degraded due to overheating.

Free Acids

An impure steroid powder may also contain a certain percentage of unreacted ester (cypionic acid, enanthoic acid, propionic acid). This extra loose free fatty acid will probably not change the efficacy of the product so long as the proper amount of complete steroid is used, but it can be painful, especially with a short chain ester such as propionate. Unfortunately there is no way to identify this problem upon visual inspection. It is good to keep in mind, however, if ever trying to figure out why one product may be more painful that a comparable item from another underground lab.

Overheating (oxidation/degradation)

Steroids can degrade under heat. The point of degradation can vary greatly between compounds. Unless the exact point of degradation is known, all steroid solutions should be heated to the melting point of the steroid material only. A thermometer should be used to ensure the temperature in the mixing pot is not allowed to greatly exceed this point. The pot should remain under heat only for as long as is necessary to melt and mix the steroid powder into solution. It should be removed from the heat source after mixing. Trenbolone acetate is an example of a steroid that can be especially susceptible to heat oxidation. Studies conducted by Hoechst-Roussel found that while the melting point of trenbolone acetate was 95-97 degrees Celsius, the drug would degrade at temperatures above 100 degrees Celsius. Many underground trenbolone acetate products are overheated and degraded.

Common Problems with Underground Products (Orals)

Dry tablet manufacturing does not present the same bacterial and direct-to-bloodstream risks of injectable steroids, and therefore these products are probably safer (in a general sense) from contamination. Still, there are many potential risks with the use of oral steroids that have been produced in sub-pharmaceutical conditions. This section details some of the more common problems associated with the manufacture of underground oral anabolic steroids.

Inconsistent Dosage

The oral steroid products of underground manufacturers are commonly mislabeled in dosage. There can be many reasons for this. For example, in many cases impure raw steroid materials are used during manufacture, as true pharmaceutical grade materials are scarcely available on the underground. Unless the lab runs regular analytical tests on the raw materials and accounts for reductions in potency, the final product is likely to have a lower dosage compared to the expected amount. In some other cases, the lab may be intentionally increasing the dosage above the labeled amount. This is conducted so that the laboratory will become popular with consumers, as word of mouth often spreads if the products of one manufacturer are significantly more potent than those of others.

Even with pure steroid materials and an intention on producing an accurately dosed product, there are many things that can still go wrong during the tablet manufacturing process. For example, one of the most fundamental considerations is the flow of the powder feeding a tablet-pressing machine. A tablet press does not measure the weight of powder. It simply presses together the material that fills a dye cavity. If the right mixture diluents, binders, and lubricants are not used in relation to the tablet equipment and speed of operation, the volume of fill can vary, and the product will not be consistent in dosage. Pharmaceutical level quality controls call for meticulous weighing and testing of tablets at all levels of normal press operation so that dosing problems can be avoided.

Substitute Ingredients

Common in underground manufacturing is the substitution of expensive raw materials with cheaper ones. This may occur at any level in the process. The raw materials manufacturer or middleman may sell it to what they view are marginal and less than savvy customers. At other times, the underground manufacturer may intentionally be substituting the ingredients to increase the margins. The raw material used is often something with a qualitatively similar effect to what is listed on the label, so that the customer is unaware of the substitution. For example, methandrostenolone may be used in the place of oxymetholone (oxymetholone is both expensive and requires a high 50 mg per tablet dosage). Another logical substitution would be to use stanozolol in place of oxandrolone, which is one of the most expensive raw materials available. In both cases, it would be difficult for all but the most experienced users to notice the difference.

Heavy Metal Contamination

Pharmaceutical grade materials should be free of contamination by heavy metals such as lead, mercury, and arsenic. Underground oral products have the same risk of contamination with heavy metals as injectable products, as the contamination tends to occur at the raw powder supply level. Although the total heavy metal contamination is usually low when it does occur, and is regarded as a result of poor processing and not purposeful adulteration, it can still be an important concern. Over time, exposure to these metals can create many serious health problems. This risk, of course, would be amplified with regular repeat exposure to impure steroid products. It is especially important that regular steroid users are aware of the potential for heavy metal poisoning with contaminated underground steroids.

Hard or Soft Tablets

Pharmaceutical tablets are always made within a specific specification for hardness. Hardness is a very important factor of tablet quality control. If the tablet is not hard enough, it may crumble while in transit. If it is too hard, it may not break down properly in the body. A "hard tablet" can be capable of passing through the entire digestive system relatively intact, depriving the individual of the drug. The relative hardness of a pill is, therefore, much more than just a cosmetic issue. Western standards typically call for a tablet that requires between 2 kg and 10 kg of force to break. A small manually operated device (Monsanto-type most commonly) can be used to test the breaking force. Note that the force for a given pharmaceutical lot should be very consistent tablet to tablet.

Specks

The tablets from legitimate drug manufacturers are very uniform in appearance. The particles of each ingredient should be blended to perfect uniformity, so there are no visible specs in the tablet. Specking indicates there is some fundamental problem in the manufacturing process. Specks can be caused by such things as the use of impure raw materials, insufficient blending, machinery contamination, incompatible ingredients, or poor handling. Lack of full blending is the most common culprit, as underground manufacturers typically lack the high volume blending and granulating equipment of registered drug companies.

Other Physical Defects

The many rigid requirements of quality control that all pharmaceutical manufacturers must follow ensure that tablets produced are made with great accuracy and consistency. Physical defects caused by manufacturing faults (as opposed to poor handling) are extremely rare. Common tablet manufacturing defects include capping, laminating, sticking, cracking, mottling, and chipping. The likelihood of encountering a defect tablet dispensed from a Western pharmacy is extremely low. Physical defects are much more common in underground manufacturing, as most of the required steps of quality control are bypassed, and the tablet making process are refined to essential steps only (basic mixing, pressing, bottle filling). Common tablet defects include the following:

Capping: When the top and bottom half or sections of a tablet separate.

Lamination: When the tablet is formed in two or more distinct horizontal layers.

Sticking: When some of the tablet material adheres to the dye wall. The tablet surface will be uneven as a result.

Cracking: When the upper or lower surface of the tablet, or less commonly, the edge, has a visible crack in it.

Chipping: When the edge of the tablet is partially chipped off.

Mottling: When the color in a tablet is uneven, with light or dark spots on an otherwise uniform tablet surface.

Added Health Risks of Underground Steroids

Anabolic steroid use is accompanied by numerous potential side effects. While a majority are temporary and cosmetic, there are also tangible health risks with the cardiovascular and hepatic systems, especially with long-term abuse. These risks, however, are generally well understood, and can be mitigated by the intelligent planning of steroid administration. Unfortunately, the expansion of underground steroid products presents additional risks to users. The user may not be aware of these risks, which stem from the use of impure materials, insufficient filtering, or even interactions between drug components that would have been noticed during legitimate pharmaceutical manufacturing. This section details some of the common added risks common to underground steroids.

Local Infection/Cellulitis

Steroid products contaminated with bacteria may cause a minor local infection of the muscle or subcutaneous tissues. The classic signs of infection include pain, swelling, and redness around the muscle of injection. The skin may also be warm to the touch, and a low-grade fever may develop. The person may also notice malaise and chills. Most infections are localized (residing in the muscle), as the bacteria will not readily reach the blood stream and infect the body. A spread of infection is known as sepsis, and is a very severe (potentially deadly) condition. Pus formation is another sign that an infection may be occurring. However, not all infections that form pus are due to bacteria. Note that some of the symptoms of minor infection can mimic other injection-site reactions.

Cellulitis (not to be confused with cellulite) is the technical term for inflammation of subcutaneous tissues, common with injection site infection. This can be proliferated by different types of bacteria like streptococcus pyogenes or staphylococcus aureus. The cells become infected causing redness, warmth, inflammation, and edema (swelling caused by fluid retention). Most cases of cellulitis can be treated with an antibiotic such as penicillin. To relieve the pain and fever, an analgesic such as ibuprofen or aspirin can be taken. Even if the injection is deep in the muscle, well below the subcutaneous fat layer, it is still possible that bacteria can invade the tissue directly beneath the skin through the injection channel. For example, sometimes people inject and cover the injection spot with sweaty or dirty clothes or underwear, leading to infection of the subcutaneous layers through the exposed channel.

Abscess (Infection)

An abscess may develop at an injection site where the tissues have become infected. The infection kills the local cells, which results in the release of toxins. These toxins start the inflammatory response. The infected area notices increased blood flow, resulting in redness and tenderness. White blood cells attack the foreign organisms, and pockets of pus form. This pus is an accumulation of fluid, dead bacteria, possible foreign material and living and dead white blood cells. In a defensive reaction the body tries to isolate the infected area. Adjacent cells encapsulate the infected area of tissue. This abscess tends to grow bigger as time goes by. The individual may also notice a persistent fever. While pathogens such as Pseudomonas, Klebsiella, E. coli, and S. aureus are the usual causative agents, unusual organisms such as mycobacteria, particularly the rapidly growing nontuberculous mycobacteria (NTM), are also commonly linked to abscess formation.

Antibiotics alone will not cure a well-formed abscess. An abscess implies that the infection has been allowed to progress to a point that it essentially closed off, so the administered antibiotics cannot reach the infection. Although a minor abscess infection may be

resolved on its own, most will *require* medical intervention in the form of physical drainage of the pocket. The doctor will cut open and drain the pus. Afterward, he/she may insert some sterile packing into the remaining cavity to minimize any bleeding and keep it open for a day or two. With time the cavity will heal, but you can expect to be out of the gym for weeks. After it does heal, scar tissue will likely remain in the area. Therefore, it is generally advised to refrain from future injections in that area.

It is often recommended to apply a warm compress or take a hot shower or bath, and lightly massage the painful tissue, at the first sign of a potential minor abscess. Sometimes this will help to dissipate the compound into the body. The body may reabsorb the pus, and the small pocket will drain spontaneously. This is often not the case, however. Do not attempt to drain the abscess with a sharp object or needle yourself. If you injure a blood vessel, the infection may spread throughout the body. Pressing the abscess to try and drain it may have the same effect. The only way to solve the problem if it persists is by visiting a doctor. Hardcore bodybuilders sometimes try their own needle aspiration. I think many readers have seen the video of Greg Valentino draining his own bicep abscess. This is very dangerous, and may result in the loss of a limb or even life.

*** Note that human skin harbors a high quantity and diversity of bacteria. Infection and abscess can also occur with the use of sterile pharmaceutical products if improper injection procedures are used. Care should always be taken to ensure proper sterile injection techniques are applied, and potential exposure of the solution and injection device to bacteria is minimized. Although possible with legitimate pharmaceuticals, infection and abscess issues remain far more common with underground steroid products, which are sometimes directly contaminated with bacteria as a result of improper manufacturing or impure materials.*



Scar left behind after surgical drainage of an infected abscess.

Abscess (aseptic)

An aseptic (also called sterile) abscess is a different form of abscess that is not caused by bacterial infection, but by non-living irritants in a drug product. If an injected drug, especially oil based ones such as anabolic steroids, are not fully absorbed by the body, it may stay where it was injected. An aseptic abscess differs from a traditional infected abscess, in that it generates internal scarring, not pockets of bacteria and pus. Such an abscess may be noticed only as a painful lump, for example deep in the gluteus muscle. If the abscess is small enough, 1/2 inch or less, applying warm compresses/hot soaks to the area for about 30 minutes every day may help. There are many potential causes of an aseptic abscess, many which involve incompatibilities in the product constituents or improper formulation.

Heavy Metal Poisoning

Heavy metals such as lead, mercury, or arsenic often contaminate underground steroid products. High levels of any of these metals can cause serious illness. For example, lead poisoning is associated with a myriad of negative health effects including gastrointestinal sickness, headaches, cognitive dysfunction, neurological damage, cardiovascular disease, encephalitis, organ damage, and potentially even death. Mercury and arsenic poisoning can also be associated

with severe neurological toxicity, organ damage, and even death in some cases. And these are just a few potential heavy metal contaminants. The buildup of metals in the body may occur slowly over time with the consumption of low-level contaminated drug products, or may cause an acute poisoning if levels are high enough. While death may be less likely to occur as a result of slow metal accumulation, the poisoning may be difficult to notice until significant damage has occurred.

Poisoning from heavy metals in anabolic steroids may seem like a far-fetched idea. Many people assume that even if these metals contaminate a drug product in small amounts, it is unlikely they would ever be present in a high enough quantity to harm someone. Unfortunately, this is not a correct assumption. While there have not been any confirmed reports of heavy metal poisoning from contaminated anabolic steroids as of yet, we have seen cases of heavy metal poisoning with both dietary health supplements and counterfeit drugs, some with dire health consequences (even death).

On July 30, 2007, a story was published in the *National Review of Medicine* concerning the death of a 58 year old woman in Canada after the consumption of drug products ordered over the Internet. The women had unknowingly taken counterfeits that were contaminated with high levels of heavy metals including aluminum, phosphorus, titanium, tin, strontium, and arsenic. The drugs were believed to have originated from Southeast Asia and Eastern Europe. The contamination was specifically believed to be present in impure filler materials that were used to press the tablets. Shortly before her death, the women complained to a friend of nausea, diarrhea, aching joints, hair loss, exhaustion, and vision problems. All of these symptoms are consistent with types of heavy metal poisoning. The death was ultimately classified as accidental — a case of cardiac arrhythmia caused by metal toxicity due to the ingestion of contaminated counterfeit medications.

An article recently published in the *South Asian Post* discusses two recent cases of heavy metal poisoning following the use of natural Indian Ayurvedic supplements.[49] One patient developed severe lead poisoning after taking one capsule per day of a natural "vigor" supplement for several years. Another became very ill from taking a powdered Ayurvedic remedy for just several weeks. In both cases, lead was found in the product.The article also references several other instances of lead, mercury, and arsenic contamination in what are supposed to be natural health supplements. The author speculates about potential sources of heavy metal contamination, including manufacturing facilities that process the raw plant materials into supplement ingredients.

The market for dietary supplement ingredients is not heavily regulated, and international suppliers from areas such as China and India provide much of the raw material for Western supplement products. This same area of the world is also known for the large scale counterfeiting of medications. Anabolic steroids products are, as we have determined already, also commonly produced in unlicensed manufacturing facilities in the same regions. The repeated finding of heavy metal contamination in underground steroid products further underlines the fact that this is, indeed, a very tangible problem.

Excessive Pain/Tissue Damage

Western drug companies have a great deal of red tape to go through in order to release any drug product. Even if it is an already approved generic drug, the product must be extensively tested before market. Different concentrations of solvents, co-solvents, preservatives, oil types, and raw material refinement processes can all affect the way the body utilizes an injectable drug. Drug companies must prove not only accurate dosing, but that the product provides the same release pattern (pharmacokinetic properties) as other generic counterparts, and that it is safe for injection. Seemingly minor mistakes in the formulation of

an injectable steroid can lead to serious issues with regard to injection site discomfort and potential tissue damage. Underground labs generally lack the sophistication to analyze their products in such detail, and often make products that can potentially damage the muscles.

Most young steroid users want to buy cheap high-dosed gear at the lowest price. For this reason, many underground laboratories feel forced by market demand to produce highly concentrated steroid preparations. It is very well known that some compounds are more painful to inject than others. Illustrating this is the fact that testosterone enanthate tends to sting more then testosterone cypionate, even though the difference is only one carbon atom. Some people can't handle trenbolone, and experience violent coughing (tren cough) after they inject it. The same is true for the "EQ-flu," a term used to describe individuals that cannot tolerate boldenone. Very often, these individual drug sensitivities are amplified as the concentration of steroid in the solution rises.

Compounds that are esterified with short esters (for example acetate, propionate, and phenylpropionate) are also known to cause greater post-injection pain. They are less stable in oil, and form poorly dissolving crystals more easily in the body. These short esters themselves can also be irritating carboxylic acids. As such, these steroids alone are more irritating at higher concentrations. Again, underground labs often produce these drugs in higher dosages. This requires a higher percentage of solvents and co-solvents to keep them dissolved in the oil. The concentration and type of solvents, co-solvents, and preservatives used to manufacture the injectable will also affect pain and soreness post-injection. These high dosed products tend to be especially painful, and sometimes damaging to the muscles.

Short esters can also be inherently very painful due to the way they react with human tissues. For example, formic acid (1 carbon atom) is present in red ant and bee venom. Acetic acid (2 carbon atoms) occurs naturally in vinegar. Propionic acid (3 carbon atoms) is notorious among bodybuilders for causing pain. The human skin hosts a bacteria (propionibacterum acnes) that has the ability to produce propionic acid, and is a cause of acne. This shows that short esterified steroids can have a very nasty effect, especially if they are made underground at a high dose per milliliter and/or are not completely purified. Some underground labs even use odd solvents to produce high dosed compounds without crystallizing. These are compounds that can sting themselves, and include guiacol, benzyl salicylate or octyl salicylate.

One reason why many injectable products are irritating is that they use very water-soluble alcoholic solvents. These may leech out of the injection-depot too soon if not properly formulated, letting the active ingredient crystallize in the muscle. This may cause a hard painful spot, as the sharp crystals can irritate and damage the surrounding tissues. If the lab had used a more oil soluble co-solvent or suitable formulation, the co-solvent would stay in the oil, keeping the steroid in solution and preventing crystallization. This issue is also why water based suspensions (testosterone, stanozolol) usually hurt the most. Water is very easily absorbed in the body, leaving the active drug crystals behind. If a drug used in a suspension is not refined to an extremely soft fine powder, the solution will certainly hurt, and may also damage your tissues. Again, these are issues often overlooked by underground operations.

Building off of this point, let's do a short math exercise. Let's say it takes the body 24 hours to absorb 1 mL of a certain oil/solvent blend. It also takes the body about 24 hours to absorb 50 mg of testosterone propionate. If 50 mg (or less) of testosterone propionate is in 1 mL of that oil, this injection should be painless. On the other hand, if 100 mg of testosterone propionate is in that same 1 mL of solution, after 24 hours the body will have absorbed only 50 mg, but all 1 ml of the oil blend. This leaves 50 mg behind in the injection area, to crystallize and cause pain.

Therefore, it is often much better to inject 3 mL of 50 mg/mL testosterone propionate than 1 mL of 150 mg/mL testosterone propionate.

Pharmaceutical compositions for intramuscular injection are also always pH balanced. The oil/solvent/co-solvent/preservative mixture is carefully assembled so that the pH of the injection fluid is neutral, usually between 4 and 7. If the pH is too low, the injection liquid is too acidic. This means there are excess hydrogen ions, which are toxic to the cells in the muscles. If the pH is too high, the solution is too basic. There are not enough hydrogen ions, which can also harm cells. Some more detailed underground labs understand the pH balance of injectables, and carefully assemble their products. Others do not. Tissue damage can occur by aggressive physicochemical properties of the injection fluid, such as high or low osmolality, acidity, or basicity. All of these situations can lead to cellular membrane destabilization and tissue damage.

It is often difficult at first to know exactly what is causing excessive injection pain or muscle damage. Of course, many things can be to blame. Injection itself traumatizes the tissues, and may alone be responsible. Some users may blame the drug, when in reality it can be small things like needle size or injection technique. When due to the solution itself, pain on the first day is often caused by too high a concentration of solvents or preservatives. If you do not develop a fever, then a painful injection spot is mostly just a reaction to an alcoholic solvent. For example, benzyl alcohol can be irritating at high concentrations (above 5%). Or it may be another solvent like ethanol or isopropyl alcohol. Pain 1-3 days later is usually caused by drug crystallization. This may or may not be accompanied by low-grade fever.

Another basic aspect of a drug to consider is its "syringability" or viscosity (thickness). Underground laboratories sometimes use cheap "food grade" vegetable oils. The better labs use pharmaceutical grade oils that are more purified, and generally contain fewer lipids. These oils are less viscous (thinner), and are meant for injection. Thinner carriers tend to be more suitable for steroid formulations because they dissipate easier from the injection depot. This decreases the chance that an infection or sterile abscess may develop. The use of thick impure vegetable oils can certainly be responsible for such issues, though (again) it would be difficult to know if this were exactly responsible without extensive testing of an offending product.

The bottom line is very simple: In an attempt to make more profit, some underground labs are using low quality ingredients. Instead of pharmaceutical grade solvents and co-solvents, they use cosmetic or industrial grade. Instead of pharmaceutical quality oils, they use food grade. Many buy the cheapest raw drug powders. On the discussion-forums people constantly post about quality and quantity. Many health conscious athletes do care about the quality of the chemical aids they use. But in the end, a majority of users (often young) opt for the cheapest means to make their muscles grow. They just want a lot, and they want it cheap. But this quest for cheap high dosed gear can certainly affect their health. For example, too many don't know or don't care about the dangers they run for a build-up of toxic-metals, etc. This is the price they may have to pay many years after the use.

Visual Inspection of Products

Given the inherent uncertainties with underground and counterfeit drugs, it is safest to use only anabolic steroids that were produced by legitimate pharmaceutical manufacturers. As we have discussed, legitimate companies are subject to extremely strict quality control requirements, and manufacture their products to standards far exceeding those of most, if not all, underground producers. Underground drugs are presently the most dominant market segment of the black market steroid trade, and account for a majority of all anabolic steroids sold illegally in the United States. They also happen to be uniquely identifiable, mainly because these labs usually try to operate as recognized companies. They often promote, focus on brand recognition, and generally do not hide their clandestine nature. If we want to avoid underground drugs, there are many things we can look for to identify them upon a simple visual inspection.

All Anabolic Steroids:

1. *Verify the Company*. Legitimate drug manufactures display their contact information on their drug packaging. With a little searching on the Internet, it should be fairly easy to determine if the manufacturer represented on a product is actually a real drug company or not. Note that real pharmaceutical companies will not limit their contact information to email addresses and websites.

2. *Check the Volume of Packaging*. Are injections in sealed glass ampules in 1 ml or 2 ml only, and tablets in flat push-through plastic and foil strips? Bottles of loose pills and large multi-dose vials are rare in human medicine outside of the Unites States. Most countries consider these packaging options acceptable for veterinary medicine only. Underground manufacturers most often use these packaging methods, as they are easy to assemble on small scale.

3. *Check the Features of the Packaging*. Is the Packaging Professional? Is there a box? Is it well printed and assembled? Are there any standout features, such as a hologram sticker or Braille lettering? While not present on all pharmacy drugs, these features are implemented in many locations. Packaging is expensive, so additional features (and cost) provide some added assurance.

Injectable Vials:

1. *Check the Label*. Is it on straight? Underground labs often put their labels on by hand, and as a result they are very often crooked.

2. *Check the Top*. Is it tight? Does the metal base move? Real drug companies seal their vials with automatic equipment. It is always very tight and professional. Underground labs typically use a hand-crimping tool. If adequate pressure is not applied with this tool every time, the crimping may be loose.

3. *Hold the Vial to Light*. For oils, is the liquid clear? There should be no debris floating in the vial.

4. *Shake the Vial*. Does the oil cloud up? A pharmaceutical grade product will remain clear. Cloudiness is a sign there is probably moisture in the product.

5. *Swirl the Oil*. Does it settle back into the bottom of the vial smoothly, or does it adhere in small lumps to the side of the vial? Adhesion to the walls of the vial can be a sign the oil is dirty or impure.



Oil droplets stick to the side of the vial on the left (adhesion)

Tablets and Capsules:

1. *Check for Markings*. Pharmaceutical companies mark their capsules and tablets with a unique symbol or code so they can identify them outside of the packaging. Underground labs often use small manually operated equipment to produce their tablets and capsules, and the process may produce plain blank tablets and capsules.

2. *Examine the Blend*. The fill inside the capsules, or the powder used to press the tablets, should be blended to complete uniformity. You should not see specks or spots in the final product.

3. *Weigh the Tabs/Caps*. Do this individually to 10 each, and compare the weights. Pharmaceutical products are made to strict standards, and the weights will be extremely even. Underground products are often inconsistent in weight. You will need a digital scale that reads to 1 mg to make an accurate measurement with most products.

4. *Assess the Overall Quality*. Tablet and capsule production is a difficult process to perfect. Drug companies go to great efforts to ensure this. Underground products generally don't, and often have visible flaws. Make sure your tablets and capsules appear like you would expect from your local pharmacy. Are they very clean, and are relatively undamaged from normal transit? Is the color even? Is the tablet laminated?

Analysis of Black Market Steroids

Lab Testing For This book

As part of this book, we sent approximately two dozen black market steroid products for analysis at a DEA licensed lab in the United States. Underground laboratories made the majority of these products, although several samples also came from registered pharmaceutical companies. These registered products were included due to their high prominence on the black market. Most of these products were obtained through contacts specifically in the Western European black market. We did make attempts to analyze the more popular labs, so that the results would be of relevance to the largest number of readers. Of course, there are many additional steroid manufacturers in operation. These results may, therefore, not be representative of the quality of other underground or registered steroid products.

It is important to emphasize that all of these samples were obtained from the black market. Products that are traded through illicit channels are very difficult to verify for authenticity. Given the high prevalence of counterfeiting with steroid products, even at times with the counterfeiting of products made by known underground labs, these are named as "Listed Manufacturer" only. No attempt to verify these products has been made.

Testing Methods

The following testing methods were used to analyze the steroid products:

Aerobic Plate Count is a measure of general sanitary quality. It quantifies the amount of bacteria found in the product, but does not identify the bacteria type. The steroid solution is placed on a general purpose medium, and the bacteria is quantified as the number of "colony forming units" (CFU) per each gram of material. For our testing, only products with less than 100 CFU of bacteria per gram are deemed acceptable. Some labs use even stricter standards.

Karl Fisher Water is a test that measures the percentage of water in a solution. While not inherently of concern, high water content in an oil-based steroid can reflect unfavorable manufacturing conditions, such as the exposure of the solution or hygroscopic (water absorbing) raw materials to unfiltered air. This test was only run on a select number of products.

Heavy Metals testing will determine the content (by weight) of toxic metals in the product such as lead, mercury, and arsenic. A specific identification of these metals is not included. Heavy metal content lower than .002% is usually required for a pharmaceutical-grade product. The slightly higher readings during these tests (<.004%, <.007%) reflect different thresholds for detection based on individual testing conditions, not contamination.

pH is a unit of measure for determining if a liquid is acidic, neutral, or basic (alkaline). An ideal pH for injection is generally considered to be between 4 and 7. Solutions with a high or low pH may cause significant irritation in the muscle tissues at the site of injection.

Chromatographic Purity is a gas chromatograph test designed to identify all major constituents of the product including the active drug, oily carriers, solvents, co-solvents, other antimicrobial agents, and impurities. This test essentially gives us a wide spectrum analysis of what is present in the steroid solution. It also provides a rough quantification of the active steroid concentration, although some deviation is expected from more accurate assay-based testing. We, therefore, consider these figures estimates only.

Overview of Labs Tested

Alpha-Pharma is registered pharmaceutical manufacturer in India. Their products are made for export only, and are unavailable on the domestic Indian market.

Asia Pharma is a licensed pharmaceutical producer in Malaysia. This company holds approval for the sale of several steroid products on the Thai market. They do not presently distribute to the Malaysian market. Some of their steroid products are available for export only.

Axio Labs is an underground steroid manufacturer. They produce an extensive line of both injectable and oral products. The ownership and location of this lab has reportedly changed in recent years. It is presently believed to operate out of Moldova.

Balkan Pharmaceuticals is a registered pharmaceutical manufacturer in Moldova. The company holds approval for the sale of certain steroids in both Moldova and the Ukraine. This company was founded by one of the former partners of the British Dragon underground lab.

Diamond Pharma is an underground steroid manufacturer. They operate out of Scandinavia, although appear to be well distributed throughout Western Europe.

Dutch Lab is an underground steroid manufacturer. As the name suggests, they appear to be based in the Netherlands.

Geneza Pharmaceuticals is an underground steroid manufacturer. They operate out of Moldova, and produce an extensive line of both injectable and oral steroids.

Elite Fitness Pharmaceuticals is an underground steroid manufacturer. They are based in the United Kingdom.

EuroChem Laboratories is an underground steroid manufacturer. They are labeled as being based in Latvia, and produce an extensive line of both oral and injectable steroids.

Euro Pharmaceuticals in an underground steroid manufacturer. They operate in Europe, and produce both oral and injectable steroid products. This lab appears to be a smaller scale operation compared to most of the other labs examined.

Gen-shi Labs is an underground steroid manufacturer. They are based in China, although widely export their products to other regions.

International Pharmaceuticals (IP China) is an underground steroid manufacturer/seller. They have been historically based in China, although have reportedly operated in other regions at different times as well. This lab has a long history of exporting unlabeled generic drug products (loose tablets, blank vials and ampules).

Jinan is an underground steroid manufacturer. They are based in China, although their products are readily distributed throughout Western Europe.

Lyka is an underground/counterfeit steroid manufacturer. This dual classification is due to the fact that Lyka is the name of a real manufacturer in India. The Lyka steroid products, however, are made by an underground lab using the same name. This lab is widely known to be underground by consumers.

ProChem Laboratories is an underground steroid manufacturer. They are based in the United Kingdom, and are widely distributed on the UK domestic black market.

Quality Vet is the name of a former veterinary manufacturer in Mexico. An underground lab in Asia now makes these products. They are not believed related to the original (real) Quality Vet.

R.O.H.M. is an underground steroid manufacturer. They are based in the United Kingdom, and are widely distributed on the UK domestic black market.

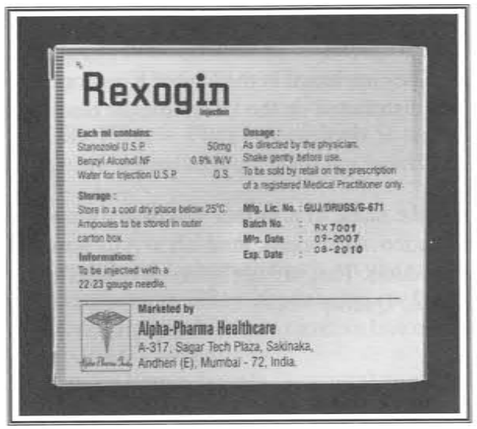
Sciroxx is an underground steroid manufacturer based in Europe. This lab was reportedly formed by one of the previous partners (a chemist) of Axio labs.

Stealth Labs in an underground steroid manufacturer in Moldova. This lab makes its products in purposefully mislabeled plastic pouches (which are labeled as cosmetics) in order to evade customs seizures in nations with strict steroid prohibition laws.

Unigen Life Sciences is a registered steroid manufacturer in Thailand. They hold approval to sell a small number of steroid products on the domestic Thai market. Many other products are also available for export.

Sample # 1

Manufacturer: *Alpha Pharma*
Product: *Rexogin*
Content: *Stanozolol*
Labeled Dose: *50 mg/mL*
Lot Number: *RX7001*
Expiration Date: *08/2010*



Analysis:

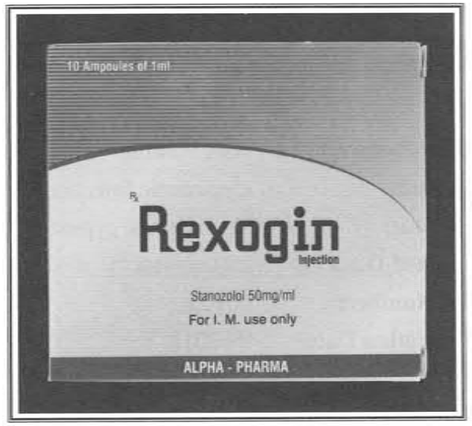
Bacteria (Aerobic Plate Count per gram): 400

Comments:

This product was contaminated with significant levels of bacteria.

Sample # 2

Manufacturer: Alpha Pharma
Product: Rexogin
Content: Stanozolol
Labeled Dose: 50 mg/mL
Lot Number: RX8001
Expiration Date: 01/2011



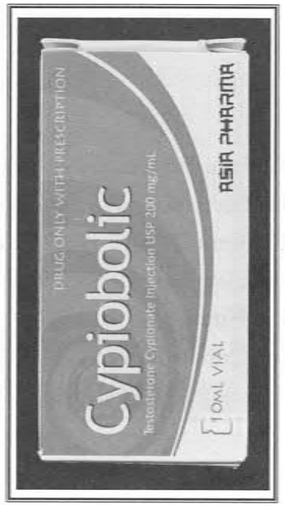
Analysis:

Bacteria (Aerobic Plate Count per gram): <100

Comments:

This product was not contaminated with bacteria.

Sample # 3



Manufacturer: Asia Pharma
Product: Cypiobolic Injection
Content: Testosterone cypionate
Labeled Dose: 200 mg/mL
Lot Number: 001C1
Expiration Date: 09/2011

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: <.1%
Heavy Metals: <.002%
pH: 3.8

Constituents:

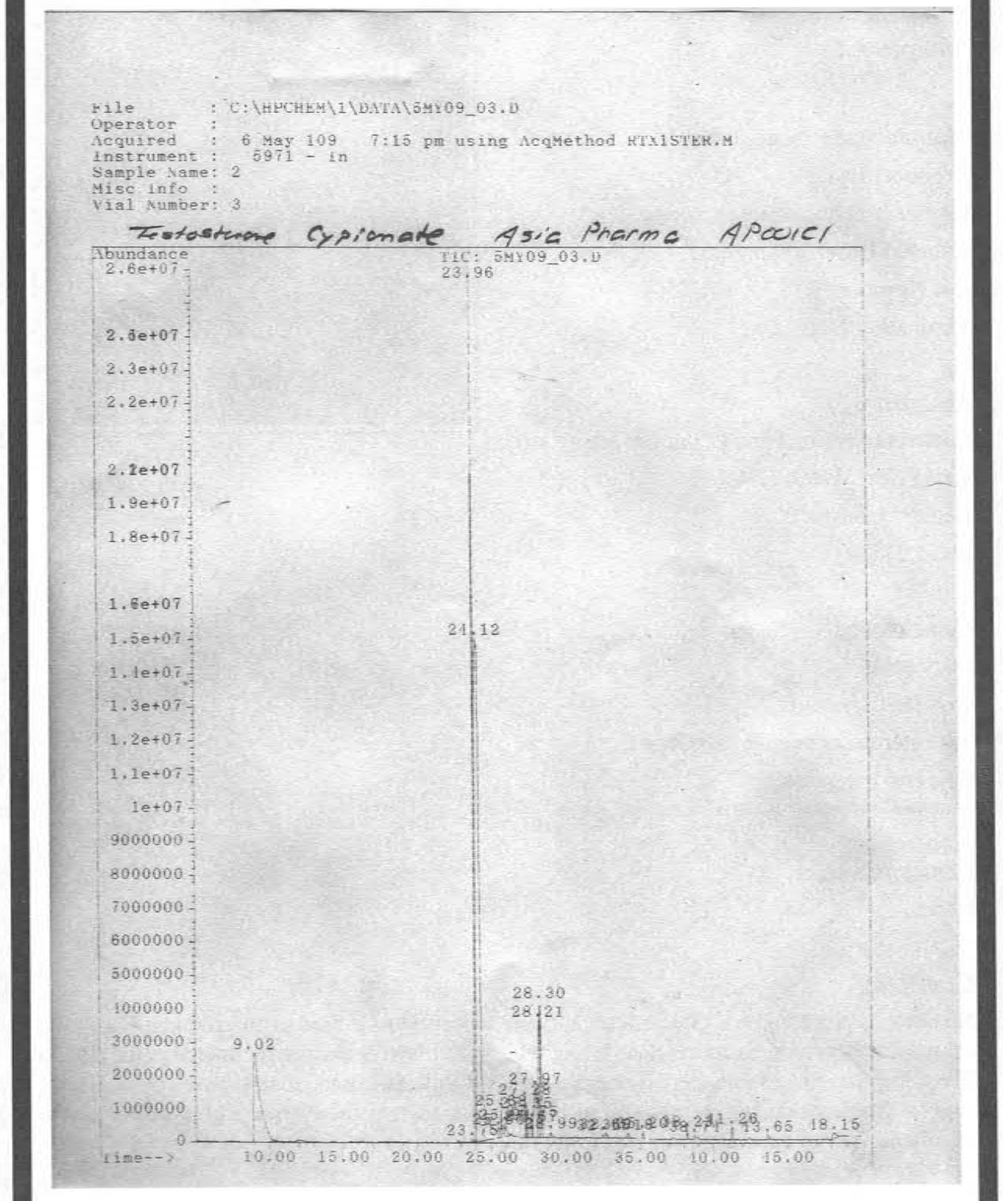
Benzyl Alcohol
Benzyl Benzoate
Fatty acids
Testosterone cypionate (190 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

None

Comments:

This product appears to be of good quality.



Sample # 4



Manufacturer: Axio Labs
Product: Testaplex C 200
Content: Testosterone cypionate
Labeled Dose: 200 mg/mL
Lot Number: RY930547472XY
Expiration Date: n/a

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: 1.76%
Heavy Metals: <.002%
pH: 5.2

Constituents:

Fatty acids
Organic fatty acids
Testosterone cypionate (210 mg*)
Glycerol tricaprylate

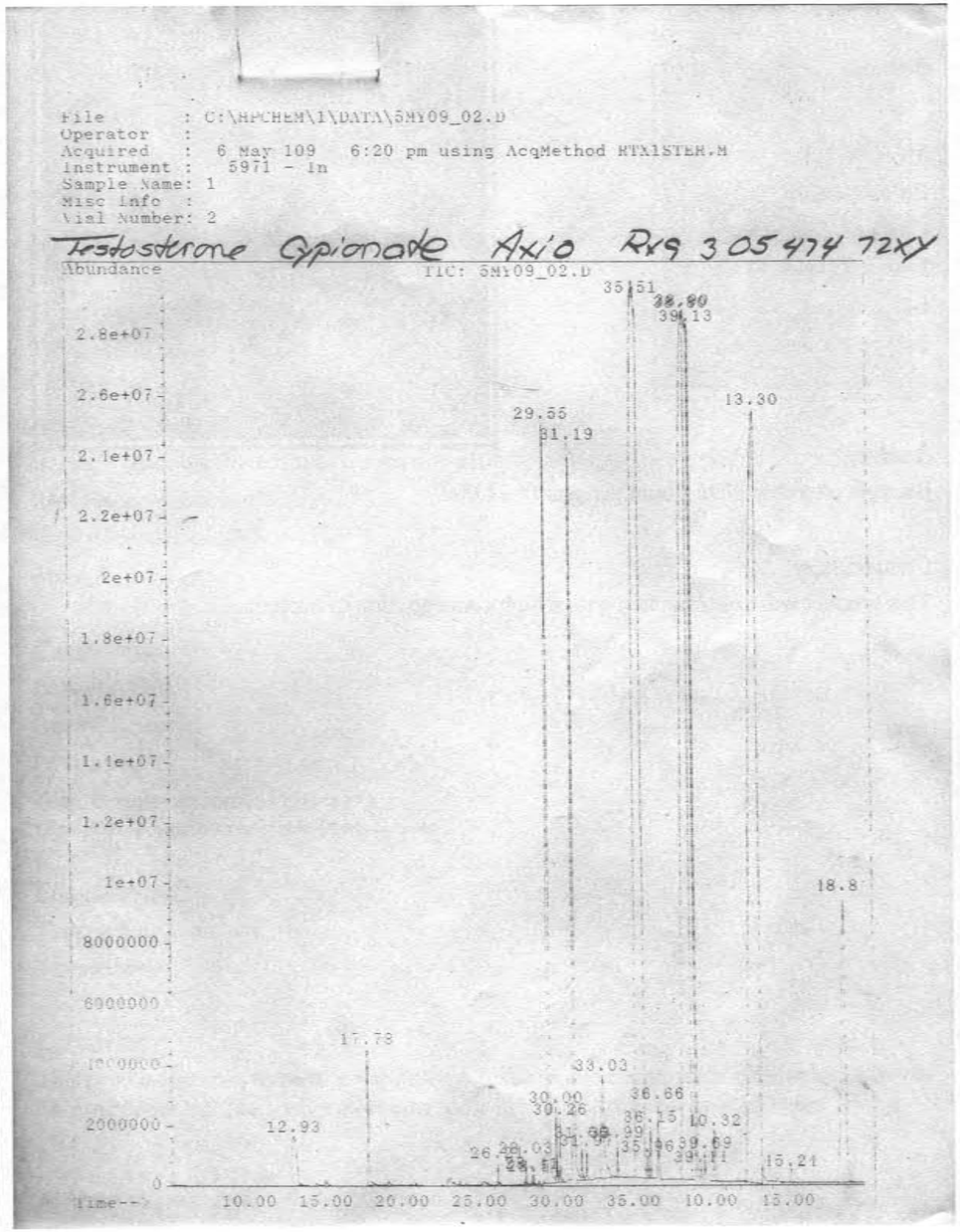
** Estimated concentration based on chromatographic purity*

Contaminants:

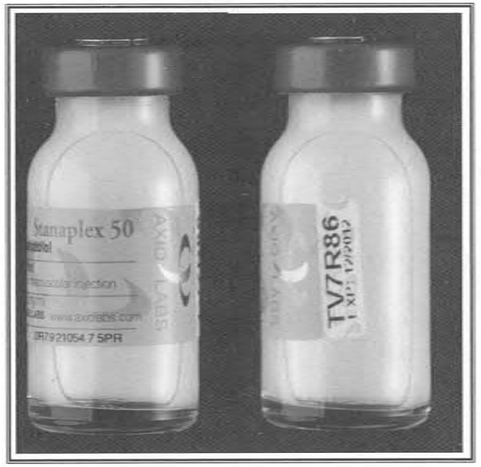
None

Comments:

No obvious preservatives. Glycerol tricaprylate (tricaprylin) is used as an excipient. This product would be considered acceptable. It might be desirable to determine the source of the amines. The water content of this steroid was also high. While not immediately problematic, it may suggest problems during the manufacturing process, such as the exposure of hygroscopic raw steroid powder to open air, or impurities in other materials.



Sample # 5

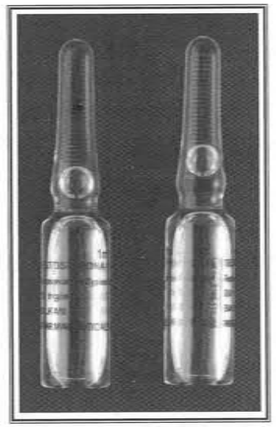


Manufacturer: Axio Labs
Product: Stanaplex 50
Content: Stanozolol
Labeled Dose: 50 mg/mL
Lot Number: TV7R86
Expiration Date: 12/2012

Analysis:
Bacteria (Aerobic Plate Count per gram): 21,000

Comments:
This product was contaminated with a high concentration of bacteria.

Sample #6



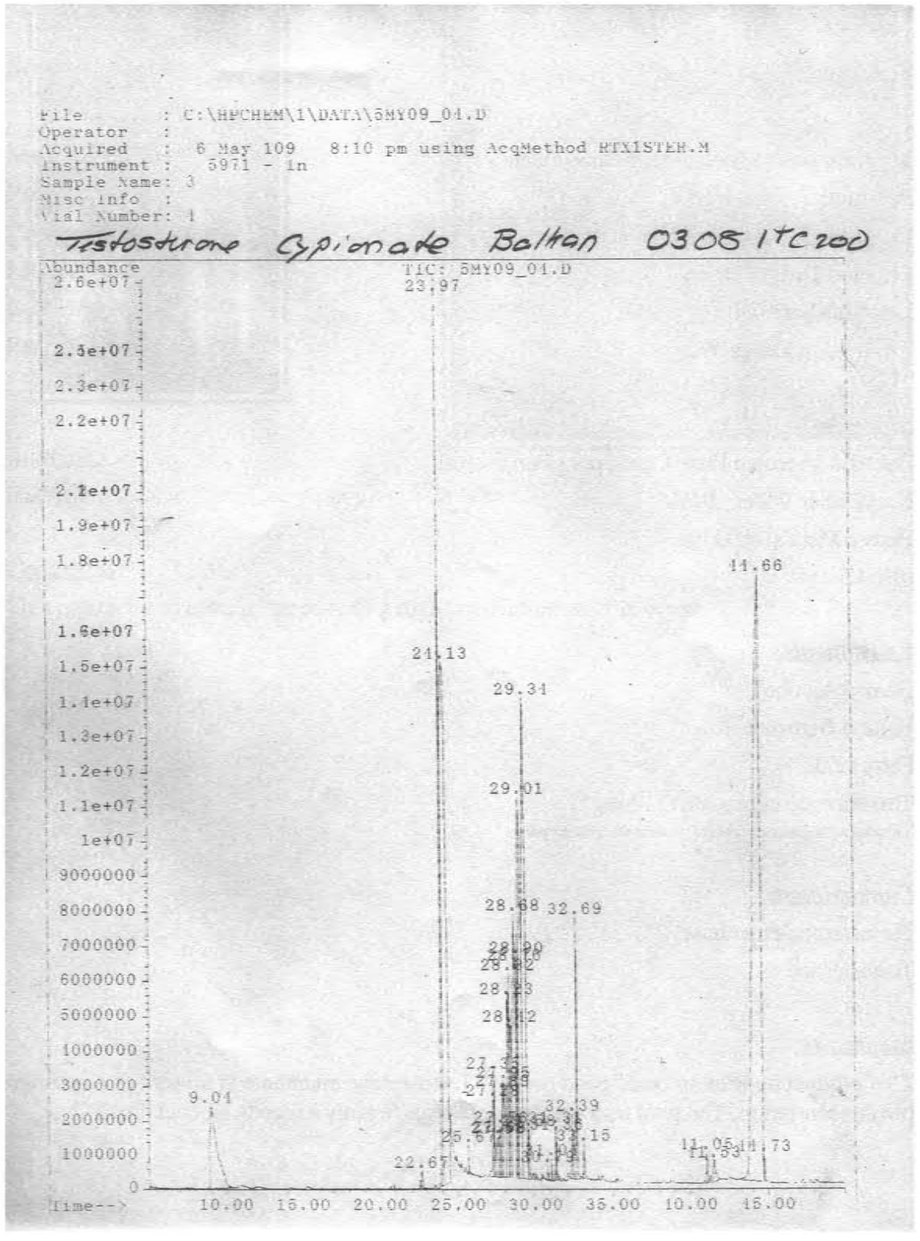
Manufacturer: Balkan Pharmaceuticals
Product: Testosterona-C
Content: Testosterone cypionate
Labeled Dose: 200 mg/mL
Lot Number: 0308 1TC200
Expiration Date: 0909

Analysis:
Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: .94%
Heavy Metals: <.007%
pH: 4.5

Constituents:
Benzyl Alcohol
Benzyl Benzoate
Fatty acids
Testosterone cypionate (210 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:
Testosterone enanthate
Testosterone

Comments:
This product appears to be of good quality. Testosterone enanthate is present in a substantial concentration. The total testosterone dose significantly exceeds label claim.



Sample # 7



Manufacturer: Diamond Pharma
Product: Decanoate 250
Content: Nandrolone decanoate
Labeled Dose: 250 mg/mL
Lot Number: 000222
Expiration Date: 01May2012

Analysis:

Bacteria (Aerobic Plate Count per gram): 1,500
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.3

Constituents:

Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Nandrolone Decanoate (240 mg*)

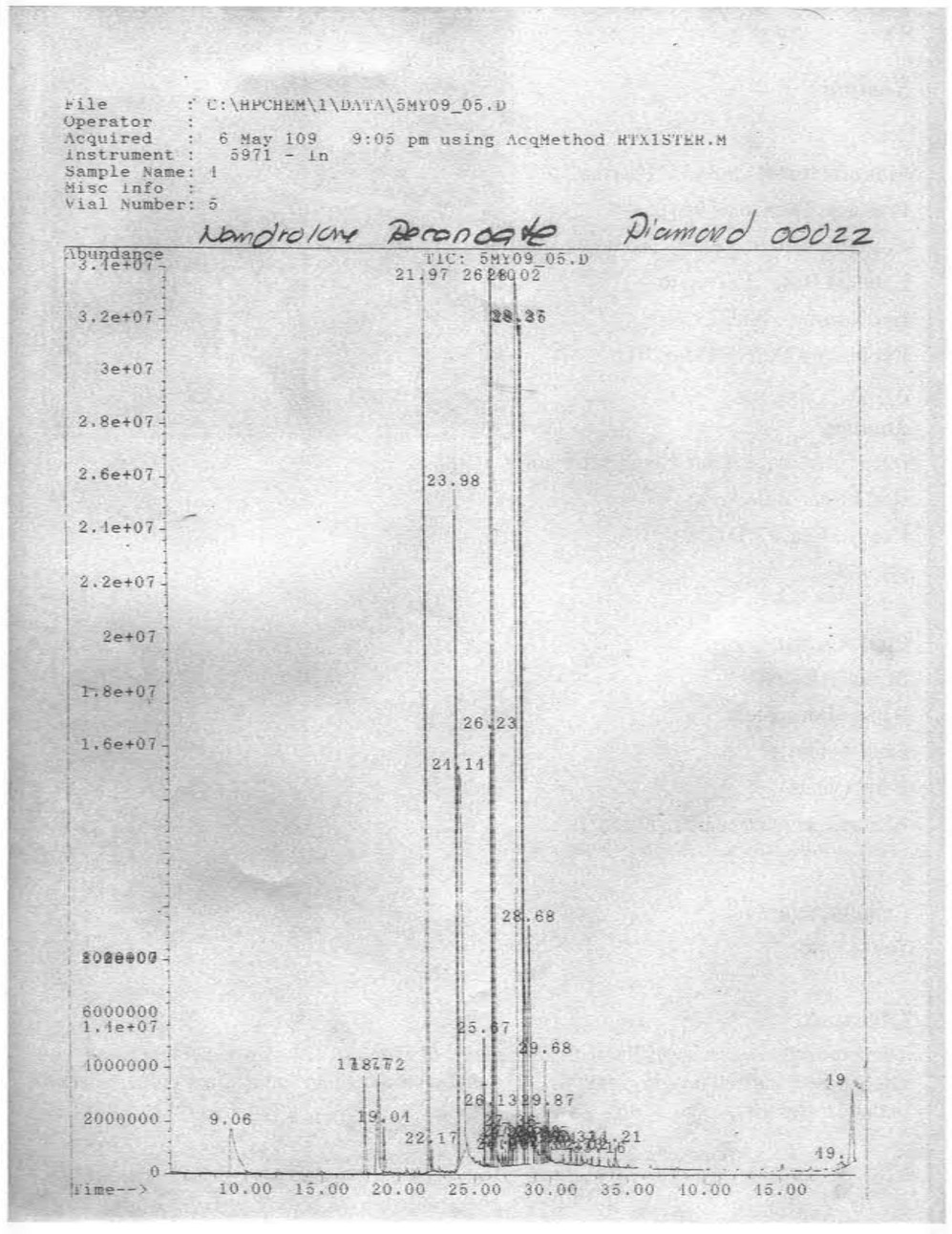
** Estimated concentration based on chromatographic purity*

Contaminants:

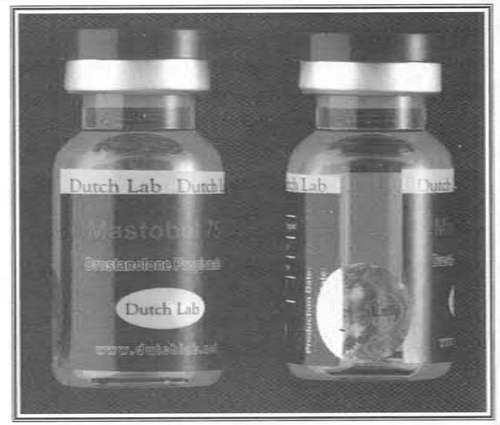
Testosterone

Comments:

This product was contaminated with a high level of bacteria. The steroid content was accurately dosed and had no heavy metals. This product did contain some minor contamination with testosterone.



Sample # 8



Manufacturer: Dutch Lab
Product: Mastobol 75
Content: Drostanolone Propionate
Labeled Dose: 75 mg/mL
Lot Number: 042007
Expiration Date: 042010

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.5

Constituents:

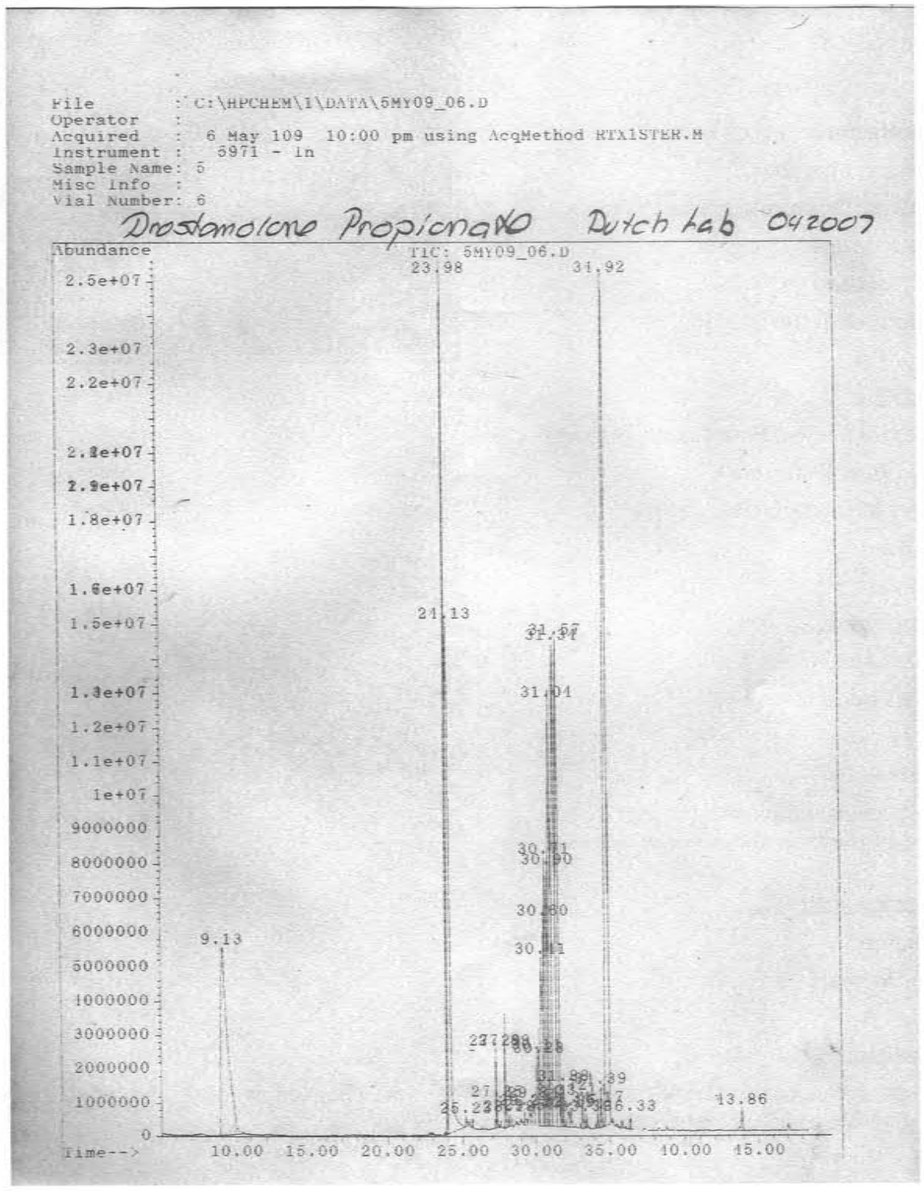
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Drostanolone Propionate (65 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Carboline
Trace Steroids

Comments:

This product appears to be of acceptable quality. The presence of low levels of multiple steroids may indicate overlap of processing of a variety of steroids.



Sample # 9



Manufacturer: Elite Fitness Pharmaceuticals
Product: Elite Propionate
Content: Testosterone Propionate
Labeled Dose: 100 mg/mL
Lot Number: 0070312
Expiration Date: 12/2010

Analysis:

Bacteria (Aerobic Plate Count per gram): 100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.1

Constituents:

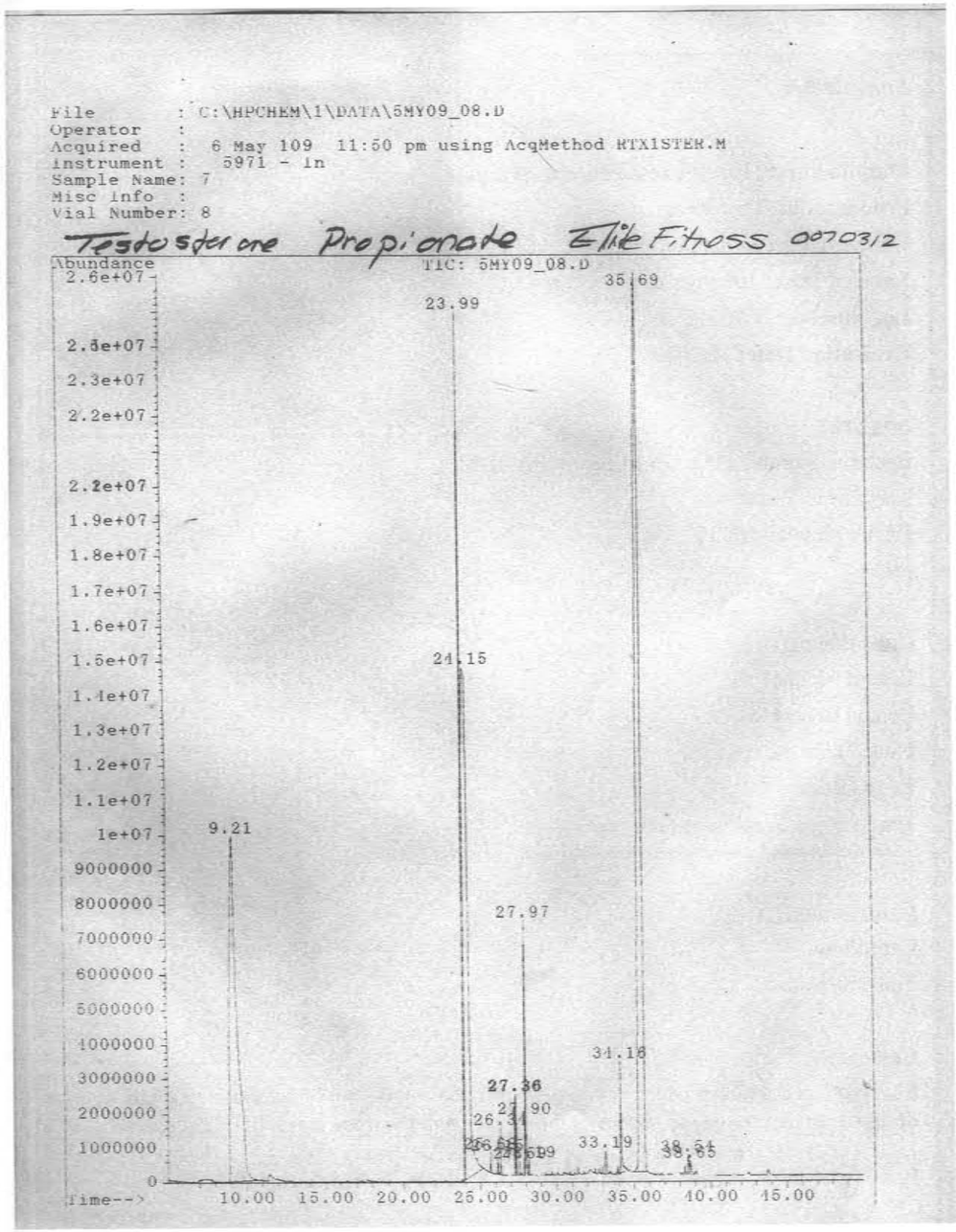
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Testosterone Propionate (110 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

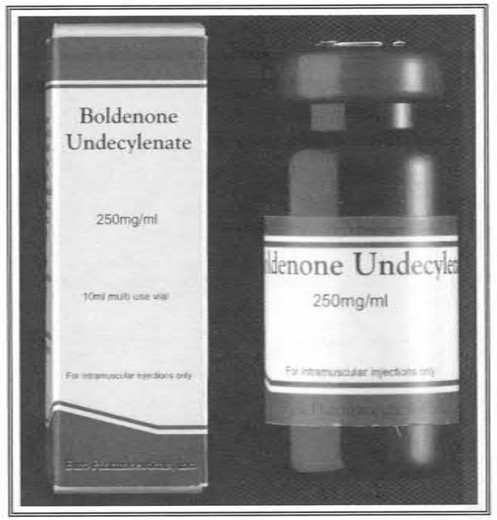
Carboline
Trace Steroids

Comments:

This product contained bacteria that were just above the limit of detection. It might also be desirable to determine the source of the amines and the trace levels of other steroids.



Sample # 10



Manufacturer: Euro Pharmaceuticals
Product: Boldenone Undecylenate
Content: Boldenone Undecylenate
Labeled Dose: 300 mg/mL
Lot Number: 0118
Expiration Date: 08/2009

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 5.3

Constituents:

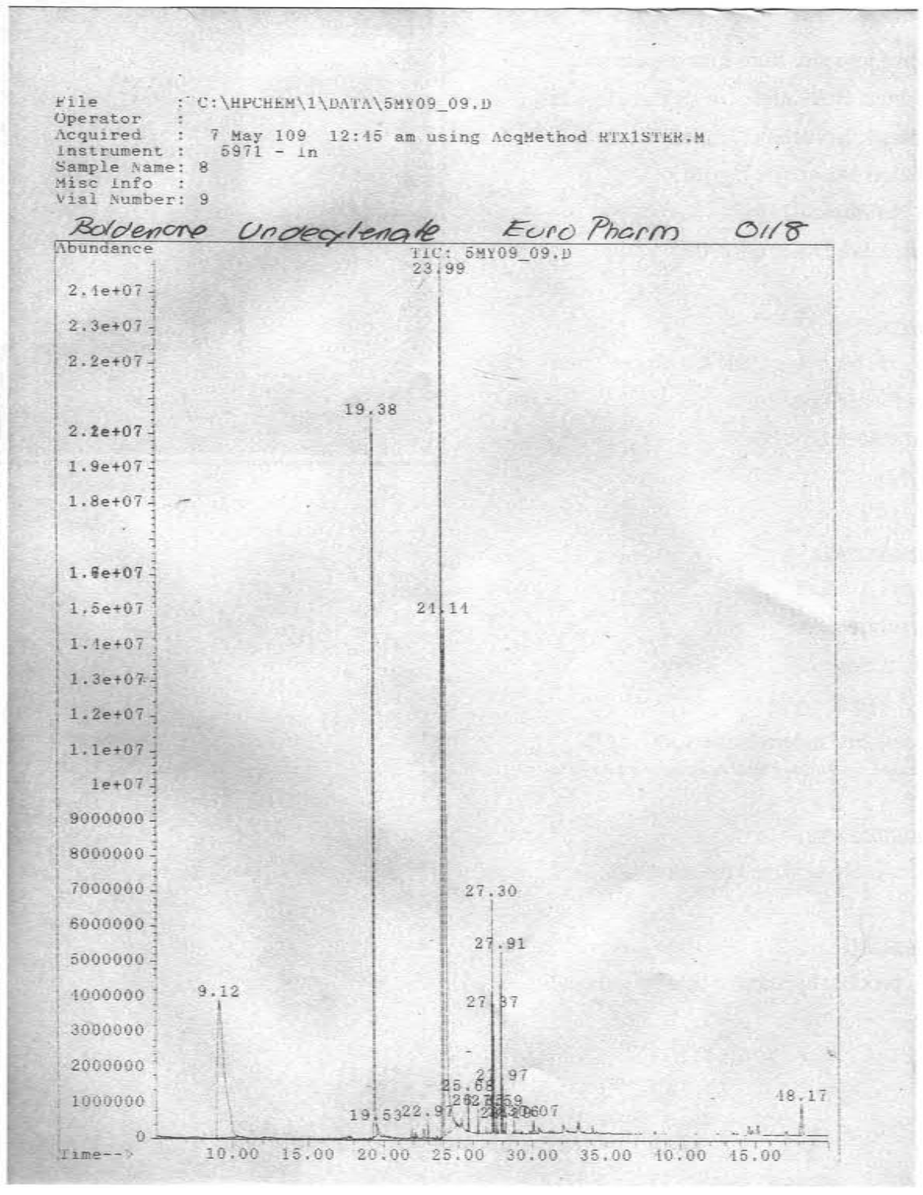
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Boldenone Undecylenate (300 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Undecanoic acid, methyl ester

Comments:

This product appears to be of good quality.



Sample # 11



Manufacturer: EuroChem Laboratories
Product: Decaject
Content: Nandrolone Decanoate
Labeled Dose: 200 mg/mL
Lot Number: n/a
Expiration Date: 03.2013

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.004%
pH: 5.1

Constituents:

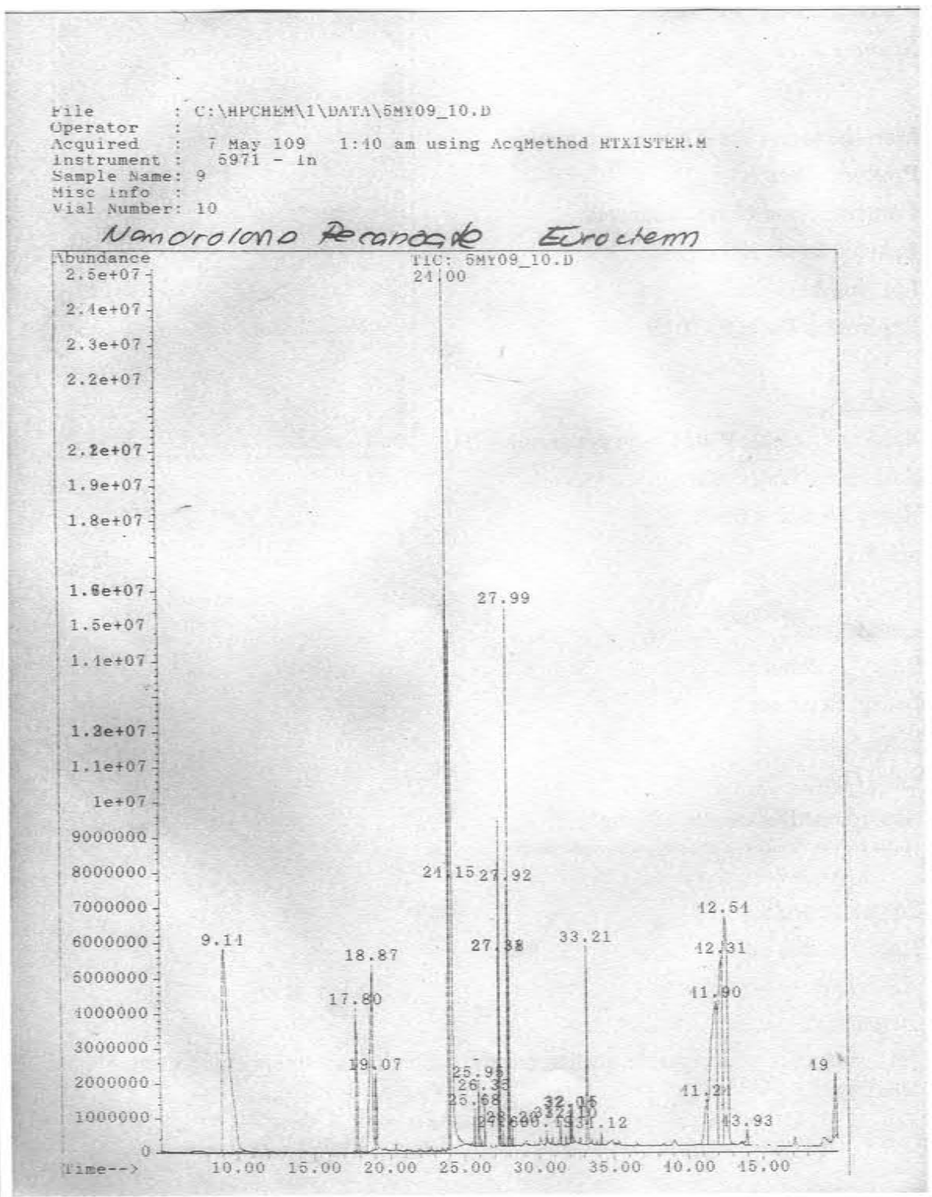
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Nandrolone Decanoate (180 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

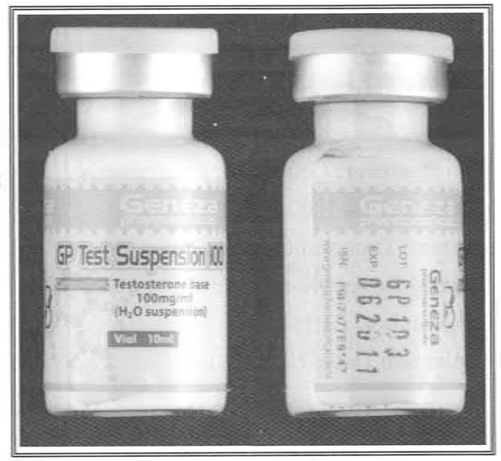
Trace Steroids

Comments:

This product is of acceptable quality, but the source of the amino components should be determined.



Sample # 12



Manufacturer: Geneza Pharmaceuticals
Product: Suspension 100
Content: Testosterone
Labeled Dose: 100 mg/mL
Lot Number: GP103
Expiration Date: 062011

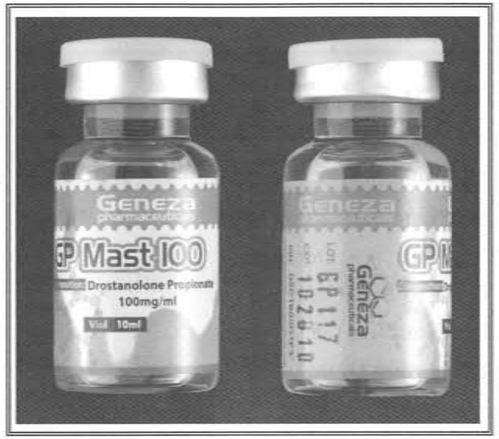
Analysis:

Bacteria (Aerobic Plate Count per gram): 4,000

Comments:

This product was contaminated with a high concentration of bacteria.

Sample # 13



Manufacturer: Geneza Pharmaceuticals
Product: Mast 100
Content: Drostanolone Propionate
Labeled Dose: 100 mg/mL
Lot Number: GP117
Expiration Date: 10/20/2010

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.1

Constituents:

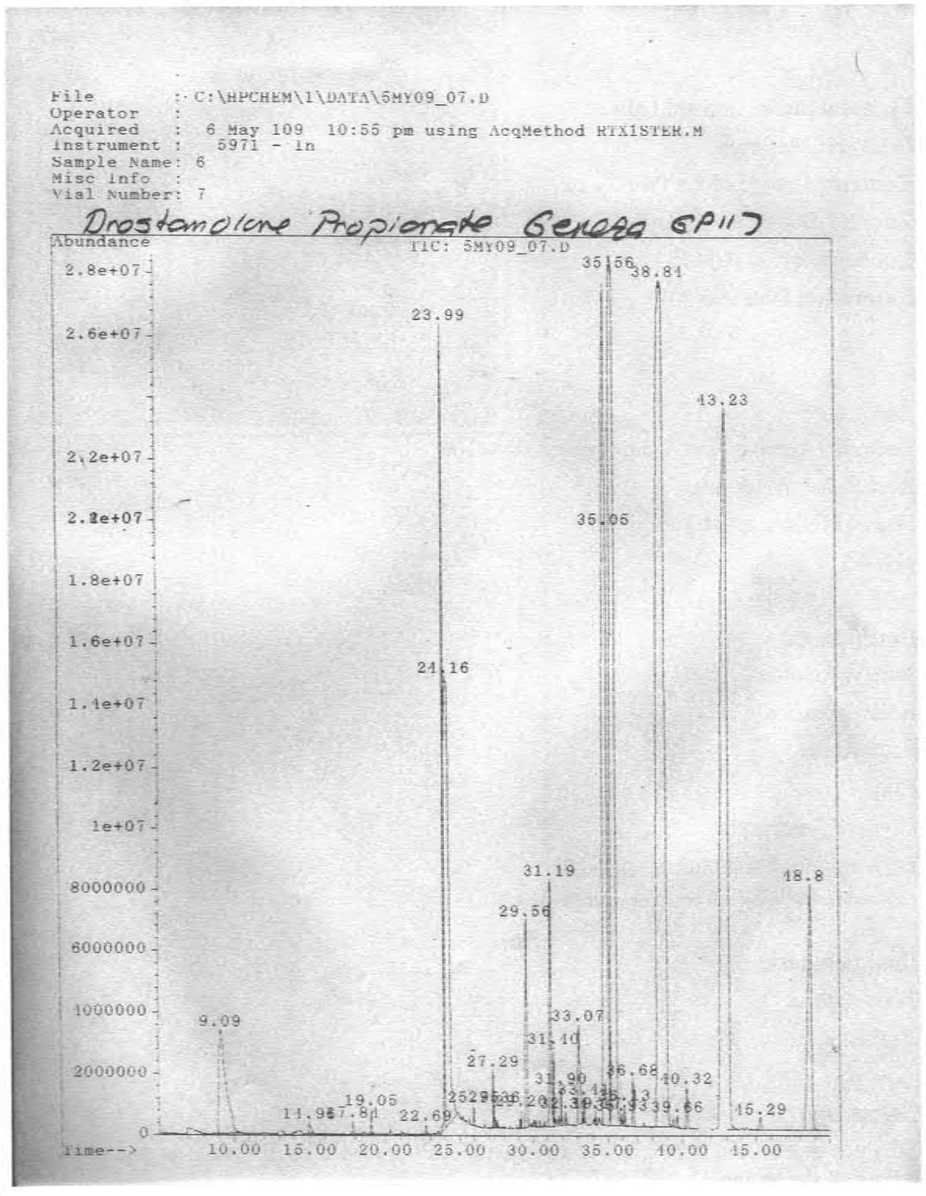
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Gylcerol Tricaprylate
Drostanolone Propionate (120 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Carboline

Comments:

This product is apparently of acceptable quality. It might be desirable to determine the source of the amines.



Sample # 14



Manufacturer: Gen-shi Labs
Product: Masteron
Content: Drostanolone Propionate
Labeled Dose: 100 mg/mL
Lot Number: GSL112523
Expiration Date: 08/2011

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.004%
pH: 4.7

Constituents:

Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Glycerol Tricaprylate
Drostanolone Propionate (110 mg*)

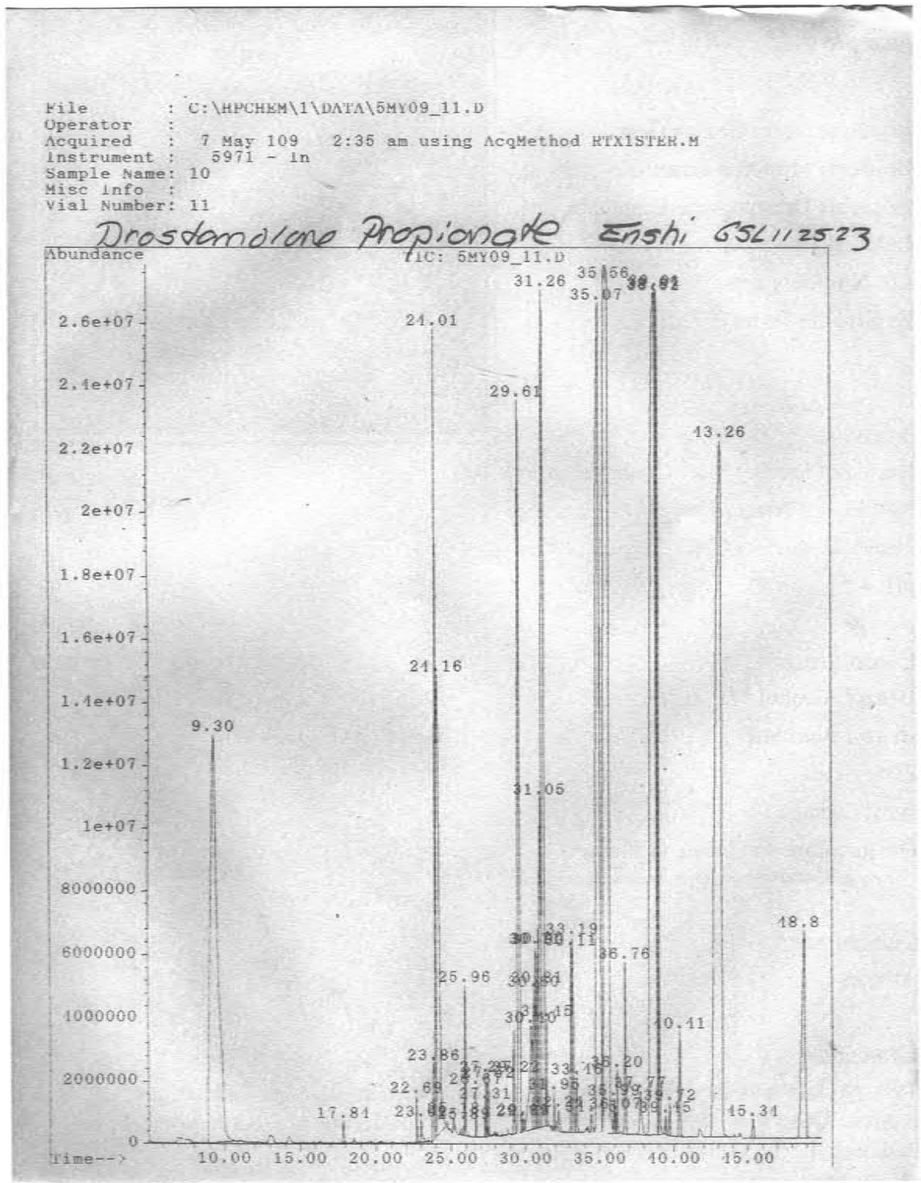
** Estimated concentration based on chromatographic purity*

Contaminants:

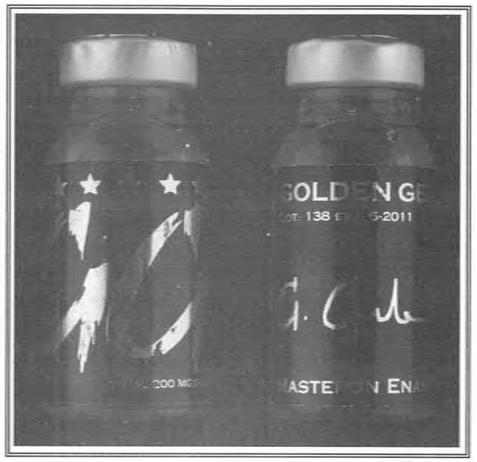
Testosterone
Amines

Comments:

This product would appear to be acceptable, but it would be desirable to determine the source of the amines.



Sample # 15



Manufacturer: Golden Gear
Product: Masteron Enanthate
Content: Drostanolone Enanthate
Labeled Dose: 200 mg/mL
Lot Number: 138
Expiration Date: 06/2011

Analysis:

Bacteria (Aerobic Plate Count per gram): 100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.5

Constituents:

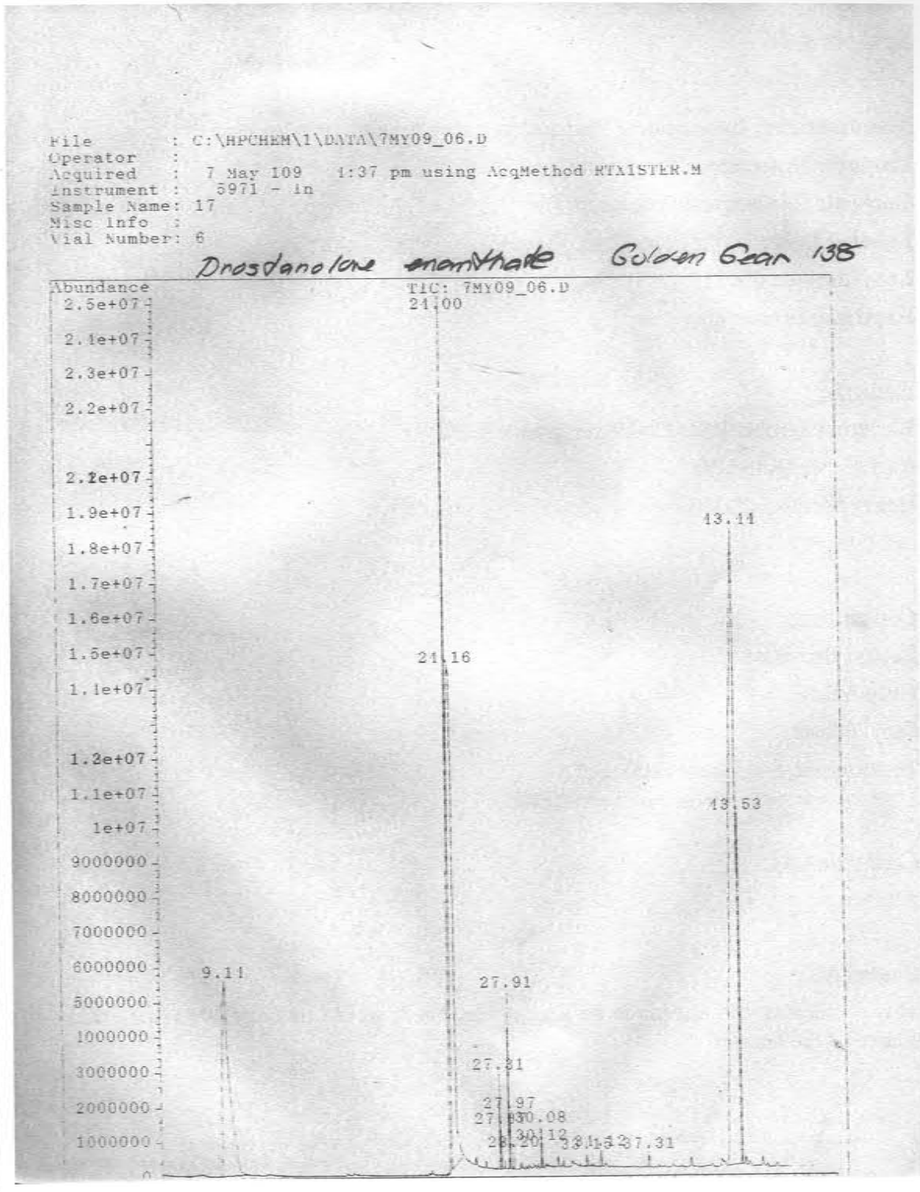
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Drostanolone Enanthate (150 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Amines

Comments:

This product was moderately underdosed compared to its label-claimed amount of 200 mg/mL. Otherwise, this product would appear to be acceptable, but it would be desirable to determine the source of the amines.



Sample # 16



Manufacturer: International Pharmaceuticals China
Product: Testosterone Propionate
Content: Testosterone Propionate
Labeled Dose: 200 mg (per 2 mL ampule)
Lot Number: 060813
Expiration Date: n/a

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.004%
pH: 5.0

Constituents:

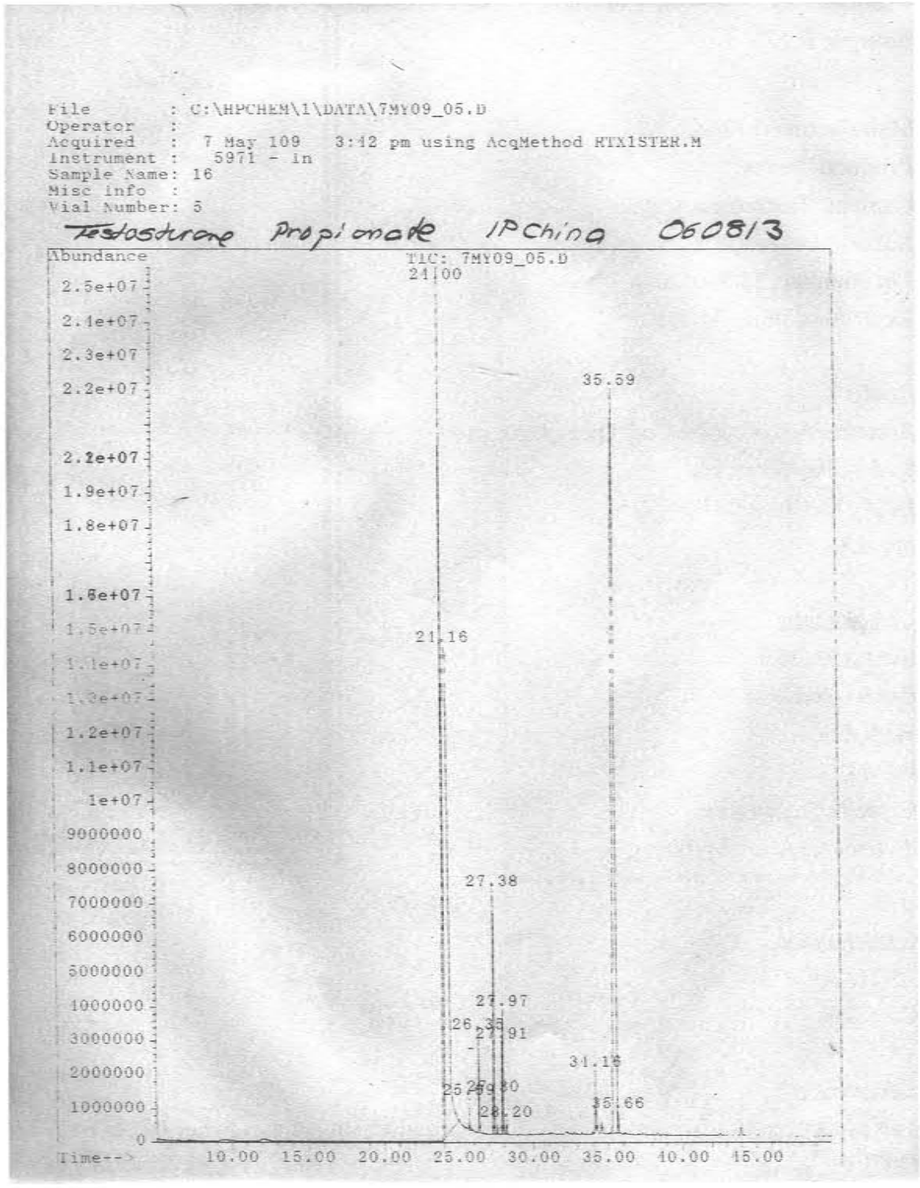
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Testosterone propionate (100 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Amines

Comments:

This product would appear to be acceptable, but it would be desirable to determine the source of the amines.



Sample # 17



Manufacturer: Jinan
Product: Trenax
Content: Trenbolone Acetate
Labeled Dose: 100 mg/mL
Lot Number: TNX-052008
Expiration Date: 04-2010

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.007%
pH: 4.8

Constituents:

Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Glycerol Tricaprylate
Trenbolone Acetate (100 mg*)

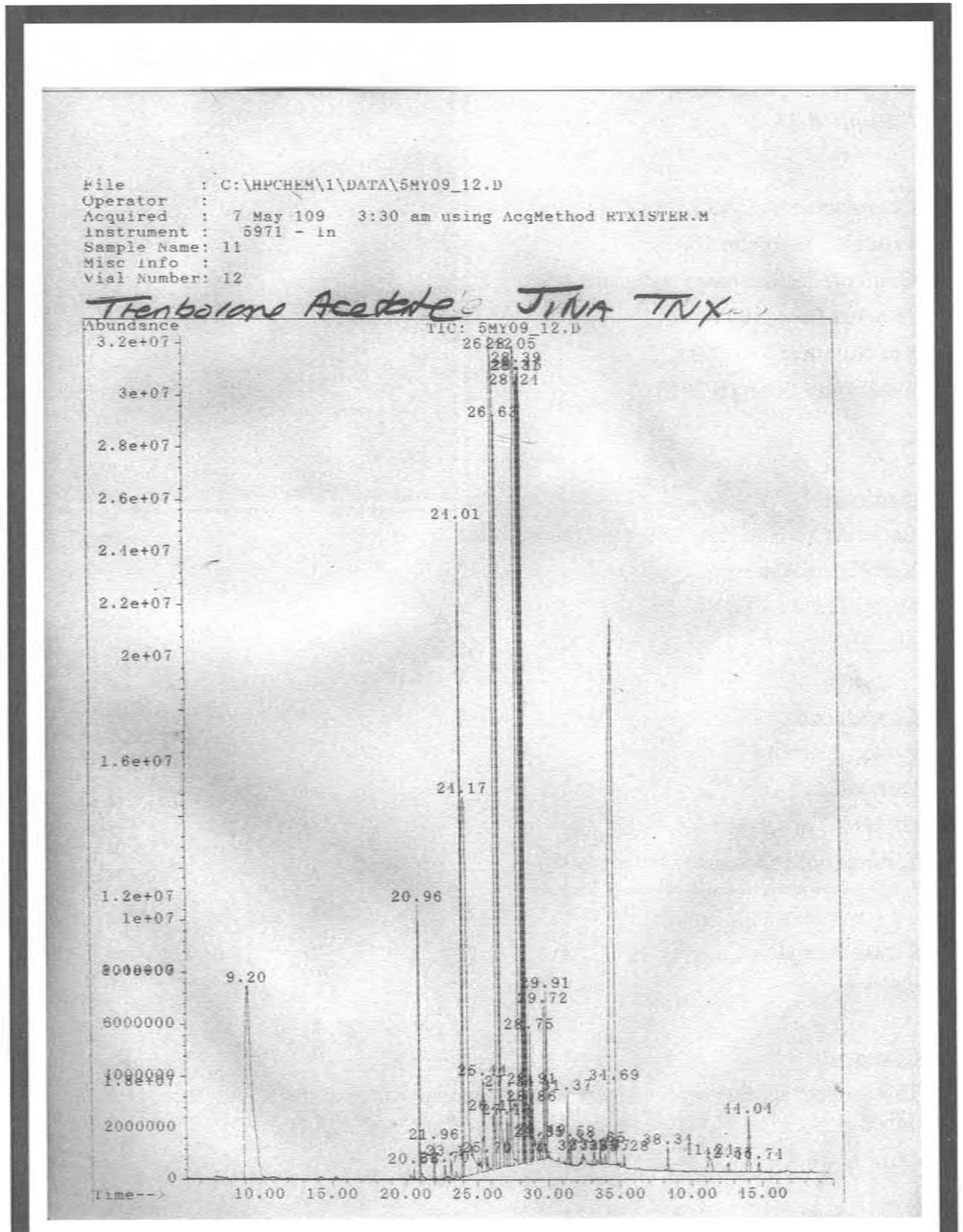
** Estimated concentration based on chromatographic purity*

Contaminants:

BHT
Carboline

Comments:

This product appears acceptable, but the source and identity of the amines should be determined.



Sample # 18



Manufacturer: Lyka Labs LTD.
Product: Testopilin-100
Content: Testosterone Propionate
Labeled Dose: 100 mg/mL
Lot Number: T2h-009
Expiration Date: 09/2013

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 7.0

Constituents:

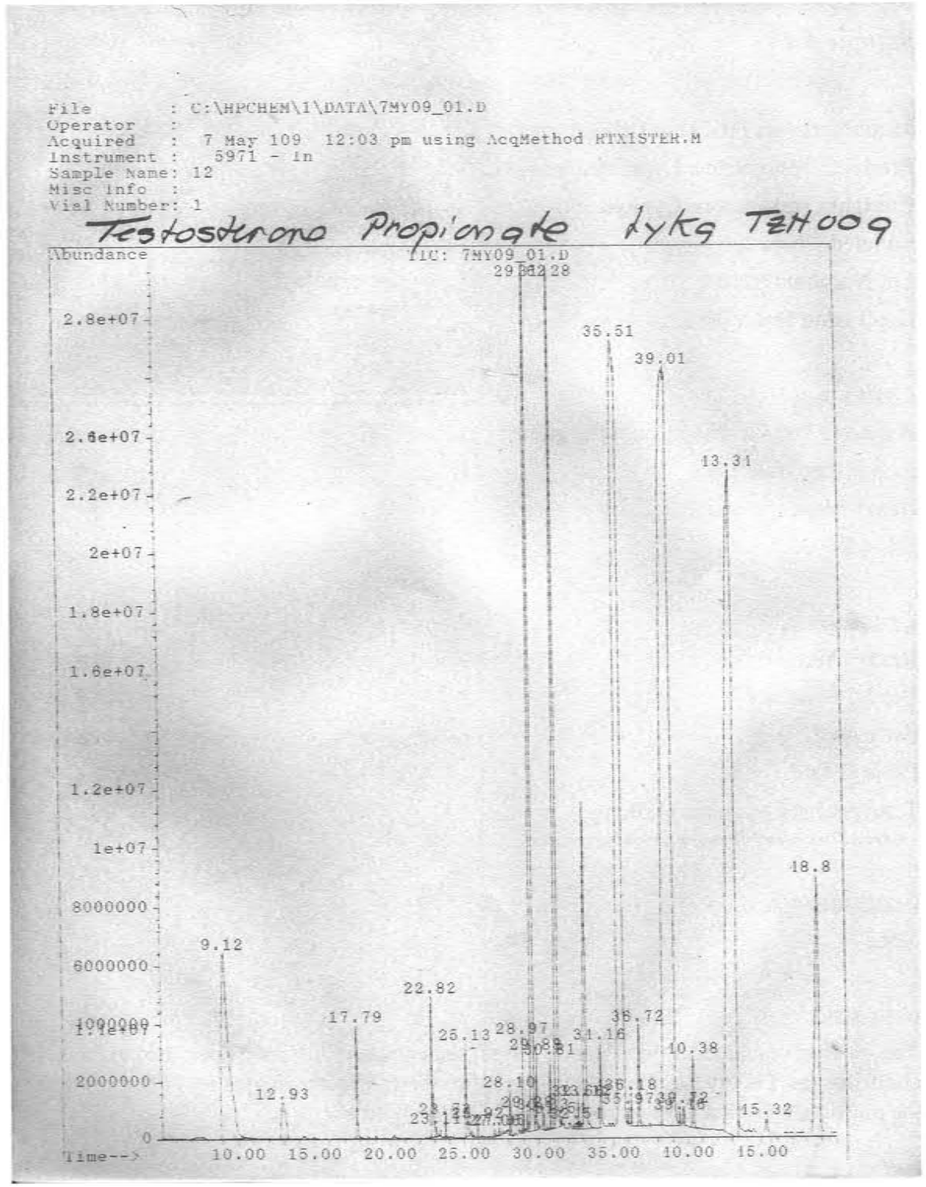
Benzyl Alcohol
Fatty Acids
Glycerol Tricaprylate
Testosterone Propionate (110 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

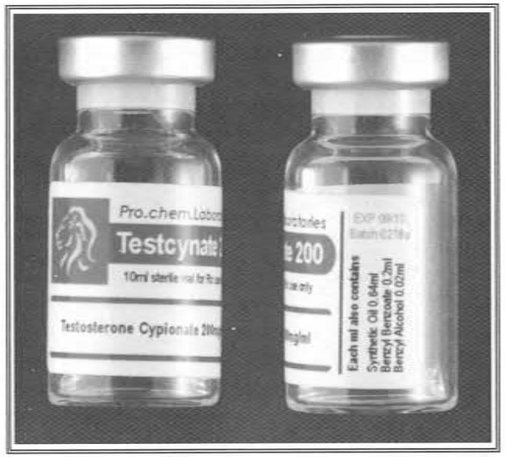
Amines

Comments:

This product appears acceptable, but the nature and source of the amines should be determined.



Sample # 19



Manufacturer: ProChem Laboratories
Product: Testosterone Cypionate
Content: Testosterone Cypionate
Labeled Dose: 200 mg/mL
Lot Number: 0218A
Expiration Date: 09/10

Analysis:

Bacteria (Aerobic Plate Count per gram):
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.5

Constituents:

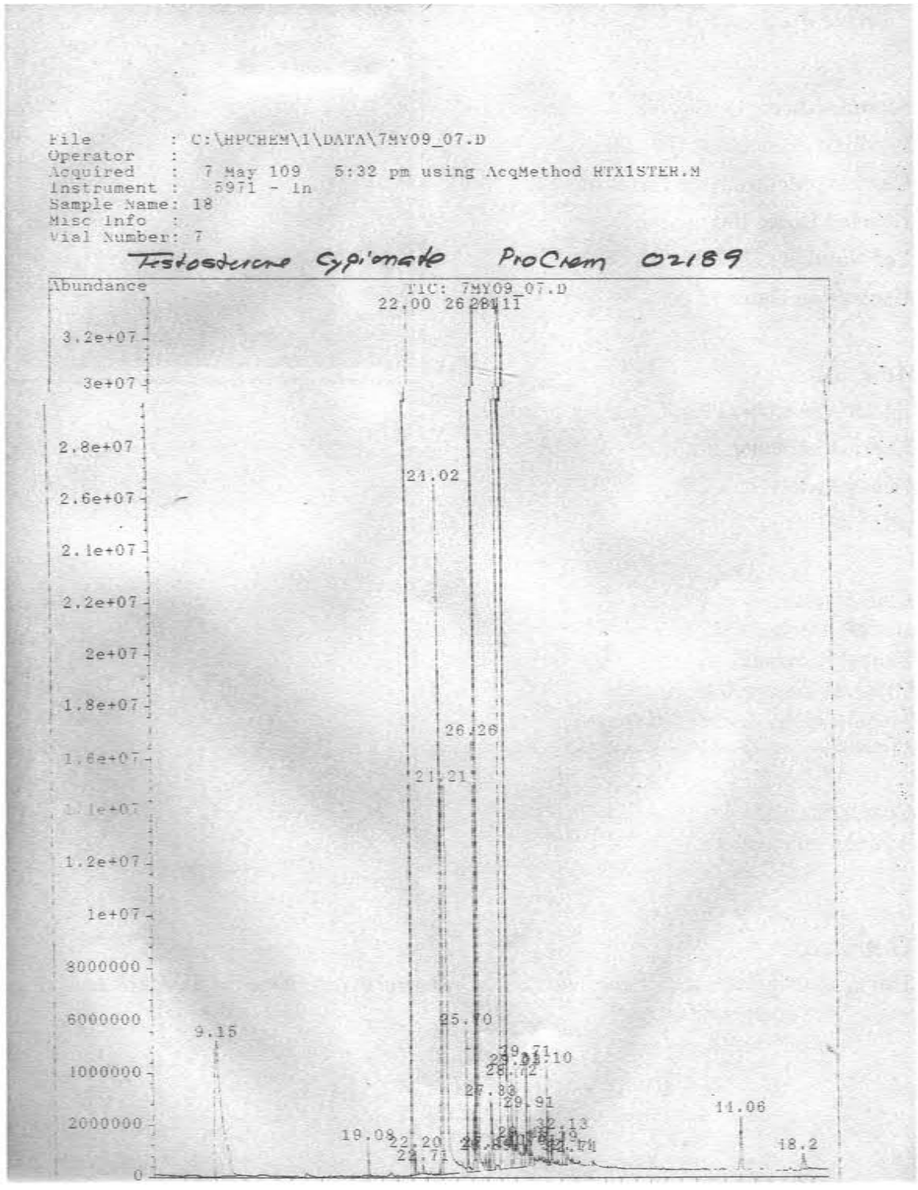
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Testosterone Cypionate (120 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

None

Comments:

This product contained a significantly lower concentration of steroid compared to the label-claim dosage. Otherwise, the product appears to be of acceptable quality. The presence of the plasticizer at trace levels may or may not be significant.



Sample # 20



Manufacturer: Quality Vet (counterfeit)
Product: Primobolan QV 100
Content: Methenolone Enanthate
Labeled Dose: 100 mg/mL
Lot Number: QVP 02
Expiration Date: 12 2011

Analysis:

Bacteria (Aerobic Plate Count per gram): n/a
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 5.4

Constituents:

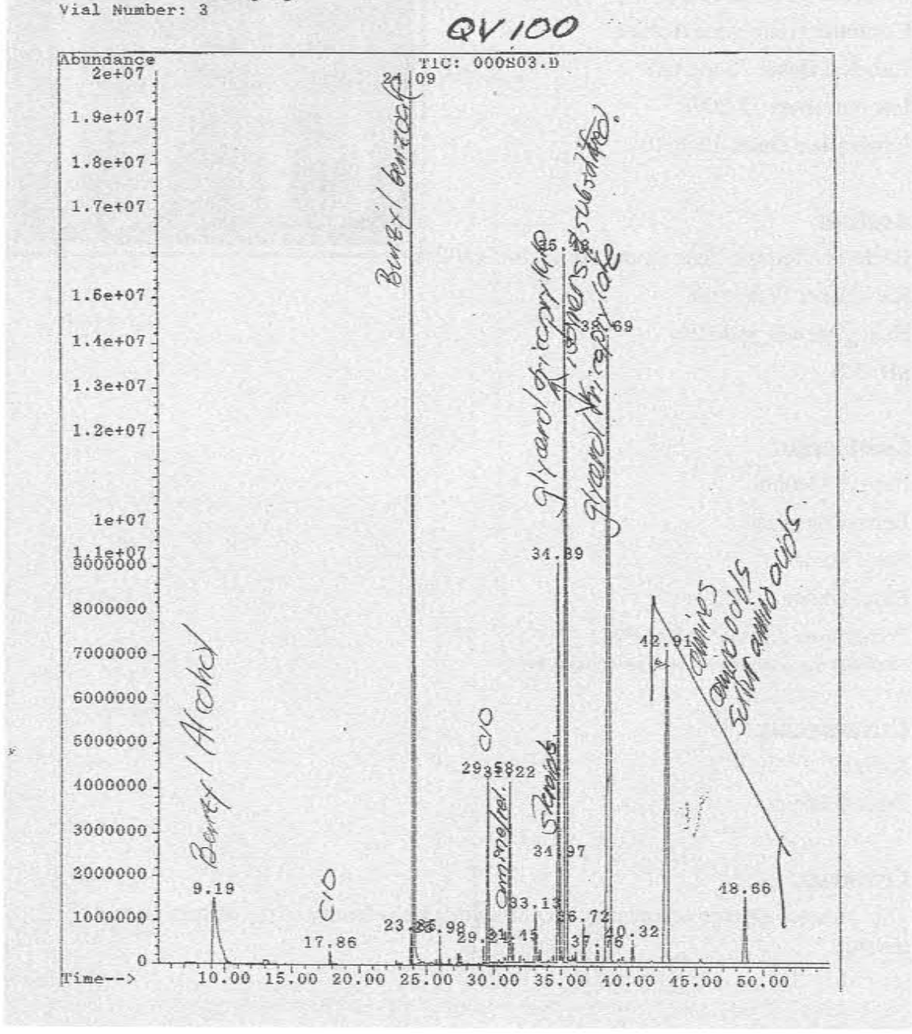
Benzyl Alcohol
Benzyl Benzoate
Glycerol Tricaprylate
Menthenalone Acetate (100mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Amines, amino acids

Comments:

This product appears acceptable, but it might be useful to determine the source of the amines and related compounds.



Sample # 21



Manufacturer: R.O.H.M.
Product: Trenbolone Acetate
Content: Trenbolone Acetate
Labeled Dose: 75 mg/mL
Lot Number: 12/2008
Expiration Date: 12/2010

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 3.6

Constituents:

Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Ethyl Oleate
Trenbolone Acetate (65 mg*)

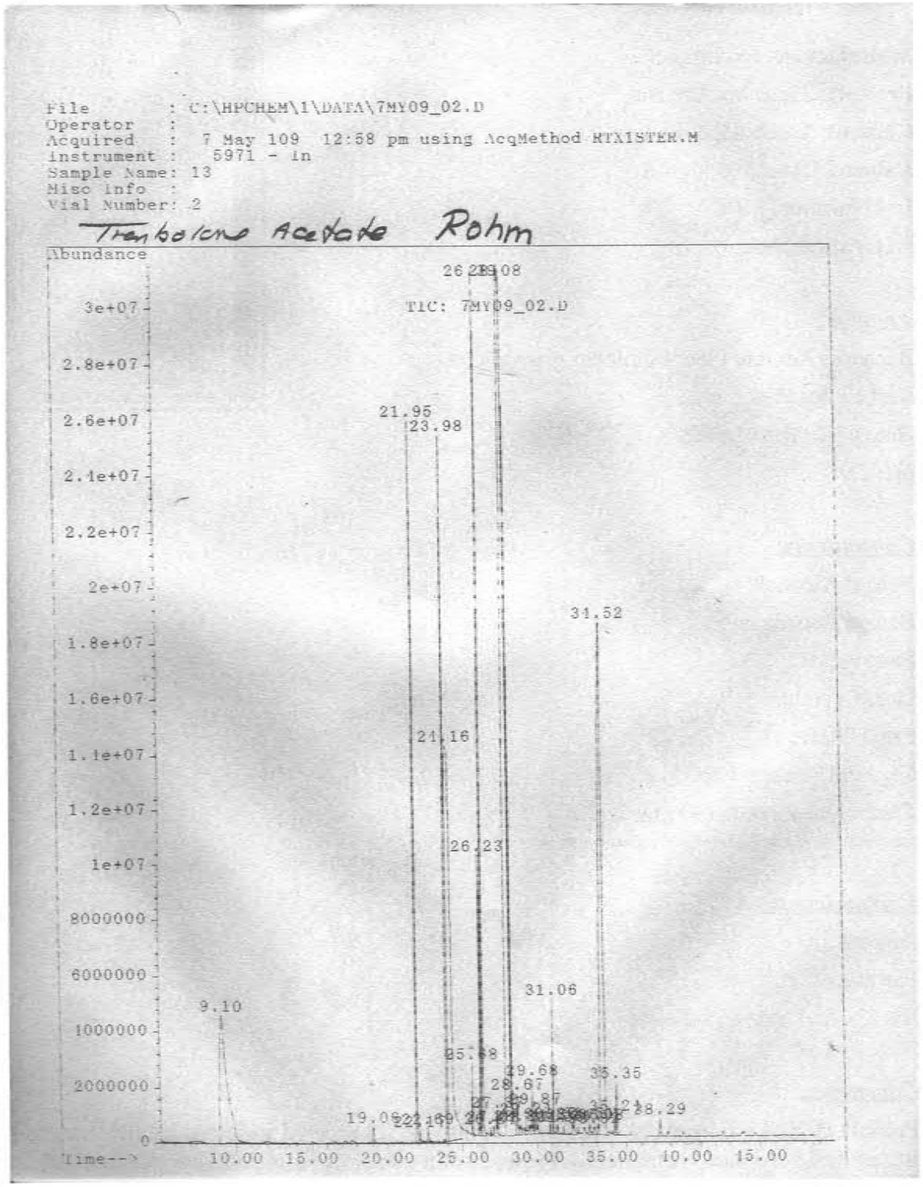
** Estimated concentration based on chromatographic purity*

Contaminants:

Amines
Trace Steroids

Comments:

This product appears acceptable, but the source and identity of the amines should be determined.



Sample # 22



Manufacturer: Sciroxx
Product: Trenadex Acetate
Content: Trenbolone Acetate
Labeled Dose: 100 mg/mL
Lot Number: 2608
Expiration Date: 09/13

Analysis:

Bacteria (Aerobic Plate Count per gram): <100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 2.9

Constituents:

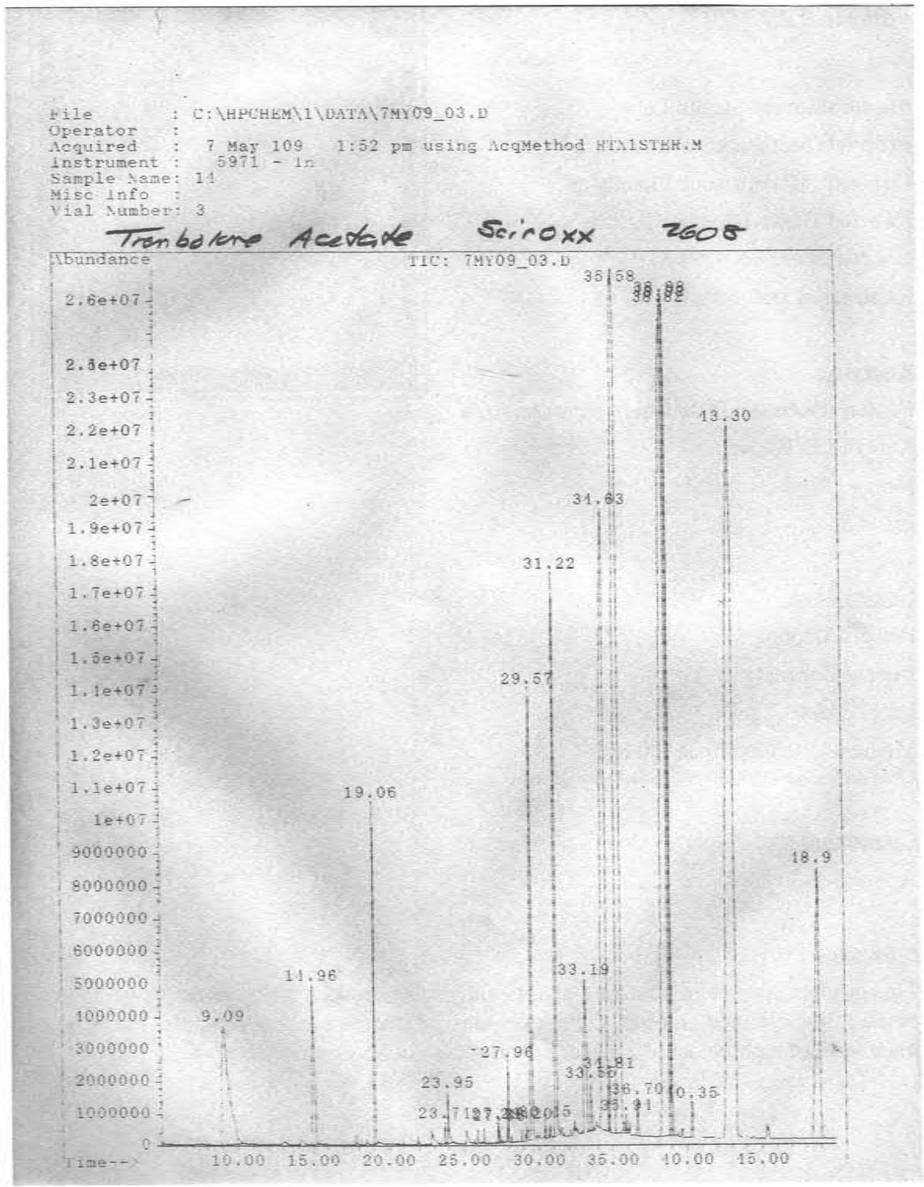
Benzyl Alcohol
Benzyl Benzoate
Fatty Acids
Organic Acids
Ethyl Oleate
Glycerol Tricaprylate
Trenbolone Acetate (90 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

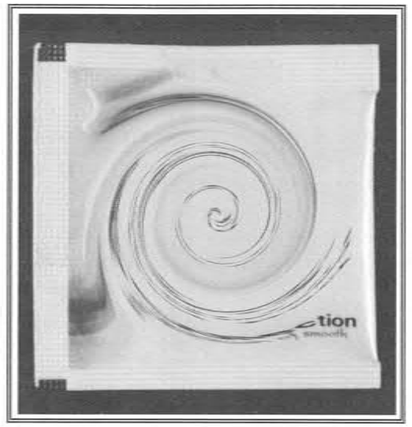
Amines
Parrafins
Bis (2-ethyl hexyl) phthalate

Comments:

Product might be considered acceptable, but it would be useful to determine the source of the amines and related compounds. Presence of a trace level of a phthalate plasticizer may or may not be significant. The pH of this solution is also low.



Sample # 23



Manufacturer: Stealth Labs
Product: Methenolone Enanthate
Content: Methenolone Enanthate
Labeled Dose: 100 mg/mL
Lot Number: 14090810
Expiration Date: n/a

Analysis:

Bacteria (Aerobic Plate Count per gram): n/a
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 4.8

Constituents:

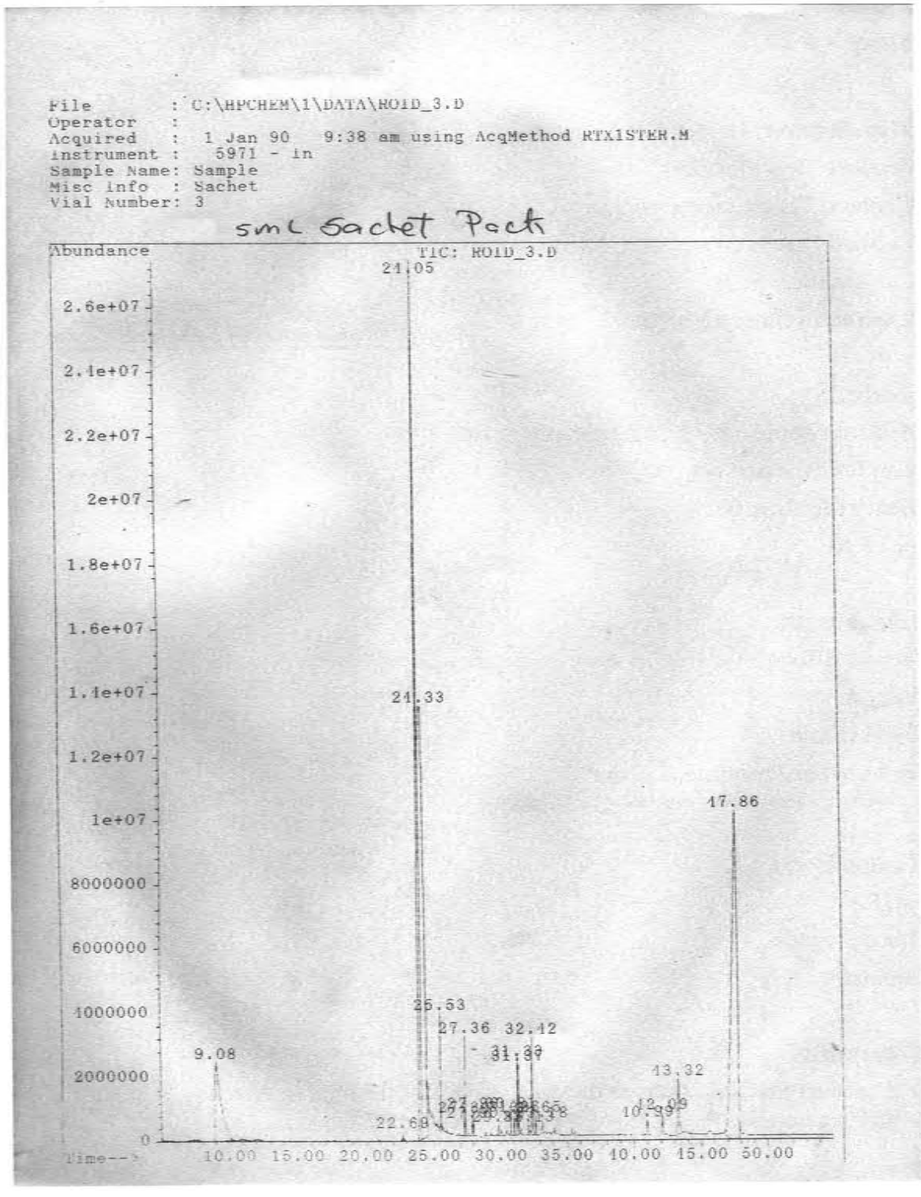
Benzyl Alcohol
Benzyl Benzoate
Ethyl Oleate
Methenolone Enanthate (80 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

Amines

Comments:

This product appears to contain a significantly lower concentration of active steroid compared to the claimed amount. Otherwise, this product appears acceptable. Presence of a trace level of a phthalate plasticizer may or may not be significant.



Sample # 24



Manufacturer: Unigen Life Sciences
Product: Depo-Test 250
Content: Testosterone Enanthate
Labeled Dose: 250 mg/mL
Lot Number: E803
Expiration Date: 02/2010

Analysis:

Bacteria (Aerobic Plate Count per gram): 100
Karl Fisher Water: n/a
Heavy Metals: <.002%
pH: 5.4

Constituents:

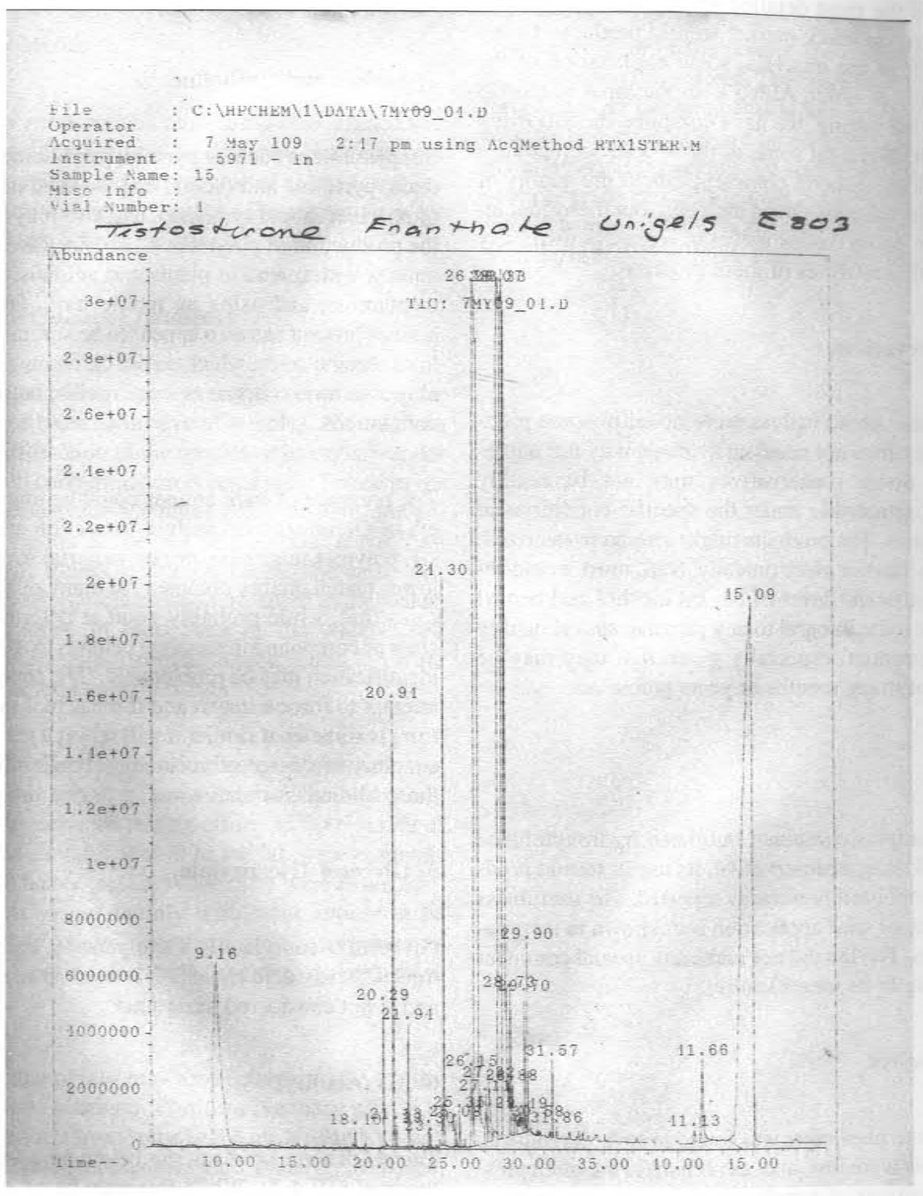
Benzyl Alcohol
Fatty Acids
Ethyl Oleate
Testosterone Enanthate (220 mg*)
** Estimated concentration based on chromatographic purity*

Contaminants:

BHT
Trace Steroids
Amines

Comments:

The product contained bacteria that were just above the limit of detection. It might also be useful to determine the source of the amines/related compounds.



Testing Comments

This was the most detailed set of lab tests we have conducted on black market steroid products. Given the depth of the analysis, some explanation of the findings is in order. Along with the input of the lab that ran the testing, we have compiled the following section to highlight some of the specific compounds found. Some general comments about the quality of the results have also been included, but these conclusions are by no means meant to represent medically valid safety analyses of these products.

1) Preservatives

No organic preservatives were noted in some products. This does not necessarily mean they are unpreserved. Some preservatives may not be readily chromatographable under the specific conditions of the analysis. The products might also be pasteurized, either by heat or electronically. Still, most would regard a sufficient level of benzyl alcohol and benzyl benzoate to be integral to any pharmaceutical quality steroid product, especially given that they may be stored for many months or years before use.

2) BHT

Some samples contained butylated hydroxytoluene (BHT). This is a preservative. Its use in steroid products has not been previously reported. The usefulness and safety of such application is unknown to these researchers. The lab did not make any special comment pertaining to its identification.

3) Plasticizer

A phthalate plasticizer was found in several products. The levels were low, and, as phthalates are often present as artifacts of handling and processing, particularly if any plastics are used during handling and processing, they are probably not significant. In general, migration of phthalates usually shows higher levels than that noted in these tests.

4) Amines and Carboline

Simple amines such as pyrrole, pyrrolidine, pyrrolidone, pyrroline and others, may be used in a variety of pharmaceutical syntheses, and also may be used in the production of polymers. Carbolines are a class of amines widespread in plants and animals, similar to tryptamine, and using an indole base. Other trace amines present can also appear to be similar to carbolines. Amino acids, which do not chromatograph well, may also be noted, not as amino acids, but as related compounds.

The presence of such amines could be due to a variety of circumstances, such as extraction and synthesis, polymer migration, or raw material sources. The lower match quality obtained for many of these indicates that, while probably good at determining the class of compound the analyte belongs to, the specific identification may be problematic. The computer will attempt to force a match and if the actual mass spectrum is somewhat similar it will report a result. These can vary in degree of accuracy. The significance of these findings is unknown.

5) Glycerol Tricaprylate

Glycerol tricaprylate is a triglyceride, and contains three C8 fatty acid chains. It is used as an excipient, and is not considered hazardous.

6) pH (Acidity)

The pH of some products was below the normal range (normal pH: 4-7). While this may be of no significance, solutions with a low pH might also irritate the

tissues at the site of injection, causing discomfort or pain. Such products may also be more prone to sterile abscess formation.

7) Heavy Metals

The heavy metal content of all samples examined was below detection limits. The detection limit can vary based on amount of sample, type of sample, and analytical variability and results. Heavy metals were not a problem with these samples.

8) Overall Quality/Comments

The most troubling issue during these tests was the presence of bacteria in several samples. Although an exact identification of the species of bacteria was not made, such contamination is commonly linked to serious adverse events including pain, swelling, and abscess formation at the site of injection. It can also cause septic illness in extreme cases. The most serious issues of contamination were noted in the water-based samples. In fact, none of the water-based samples originating from an underground lab were without bacteria contamination.

Aside from the samples with bacterial issues, the results for this round of testing were generally good. Unlike our previous testing efforts in 2007, none of the steroid samples sent in to the lab were contaminated with heavy metals. While there were minor contamination issues, mainly with what appear to be intermediary chemicals, there were no reports of gross adulteration. Generally, the drug dosages were also good.

Our selection of labs may have influenced the quality of the results obtained. This time we made efforts to obtain products from some of the most widely known and distributed companies and underground labs. These operations may have been more interested in quality assurance than traditional clandestine steroid labs, such as those identified during Operation Raw Deal.

In reviewing all of the results, we can still see that there is reason for concern. The repeat finding of bacteria and other contaminants at low levels clearly illustrate that even in these larger underground labs, manufacturing operations are such that true pharmaceutical grade products are not easily made. Readers remain warned of the potential health risks associated with the use of illegitimate black market steroid products.

Conclusion

Conclusion (Evaluating Steroid Prohibition)

The purpose of *UNDERGROUND ANABOLICS* was to examine steroid prohibition, with a special focus on determining what effect this prohibition has had on the supply of anabolic steroids to remaining users. As we have seen, steroid use remains widespread in the United States. This trend seems to be repeated in many Western consumer markets. Furthermore, previous testing, as well as our own series of tests that were conducted specifically for this book, strongly suggest that true pharmaceutical grade products represent a small minority of the drugs sold on the black market. Instead, various types of contamination are fairly common when steroids are made under sub-pharmaceutical conditions. As a result of our investigation, we feel comfortable drawing several conclusions about the present illicit steroid market. We've also made a few recommendations for dealing with this issue in the future.

Conclusions

1) While the effect of steroid prohibition on overall usage rates seems difficult to determine at this time, anabolic steroid use among both teenagers and adults is more popular today than it was prior to the enactment of prohibition laws.

2) Steroids are often smuggled through non-traditional routes, and are arguably more difficult to interdict than marijuana, cocaine, or heroin. These drugs are also highly lucrative illicit commodities, with wide margins between raw material cost and profit. A lucrative black market for these drugs will continue to thrive in spite of criminal prohibition laws.

3) Steroids remain widely available throughout the world for legitimate medical uses. Additionally, most nations do not regard them as strong societal dangers, or have criminal laws against their possession. It will continue to be difficult to control the supply of these drugs in the years to come.

4) Steroids produced and traded illegally present additional health risks to users by way of potential contamination with heavy metals, bacteria, and other drugs/chemicals, and mislabeled ingredients and dosages. These risks are arguably greater (especially in an acute sense) than those associated with the actual non-medical use of anabolic steroids.

Recommendations

1) Consumers should be aware of the potential additional health risks associated with the use of counterfeit and underground steroid medications, and avoid the use of these drugs if possible. For those determined to use steroids without medical necessity, efforts should be made to obtain only legitimate pharmaceuticals, even if they are more expensive and less readily available.

2) For educators and healthcare workers, any effort at steroid harm reduction should include a detailed educational program informing active and potential users about the additional health risks associated with counterfeit and underground steroid medications, and the prominence of contaminated and mislabeled drugs on the black market.

3) Lawmakers are reminded to consider the nature of an operating illicit market, not just the unattainable ideal of complete substance elimination. A critical evaluation of current anabolic steroid prohibition laws, and how they are affecting both usage rates and risks to users, is strongly recommended.

Endnotes

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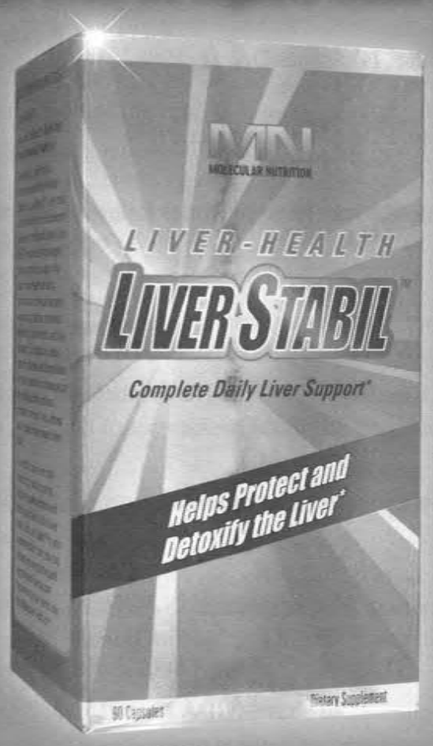
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