

## Cholestasis in a Body-BUILDER after use of Metandienone - a Case Report

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### Abstract

The use of anabolic steroids is widespread particularly among bodybuilders. Students and teenagers apply the substances without practise in sport. Most athletes have only a crude pharmacological knowledge regarding these drugs and warnings of steroid misuse are neglected. We report on a 24-year old man who was supplementing his training program with the uptake of high doses of Dianabol<sup>®</sup>, 50 mg daily since 8 weeks. He was admitted to the hospital because of left-side flank pain. The blood chemistries showed elevated aspartate and alanine aminotransferases, elevated creatine kinase and creatine and normal  $\gamma$ -glutamyltransferase levels. Metandienone could be detected by gaschromatography/massspectrometry. Clinical findings and biochemical parameters were compatible with cholestasis induced by anabolic steroids. The illicit use of megadoses of androgenic anabolic steroids to obtain an athletic, healthy looking body can lead to serious and often irreversible organ damages. In the case of hepatotoxicity and severe cholestasis the prompt withdrawal of the steroid and the administration of ursodeoxycholic acid is recommend.

### Introduction

The number of women and men, including teenagers and young adults, in popular sports self-administering ergogenic agents is an increasing problem. Most athletes use anabolic-androgenic steroids (AAS) to obtain a well trained, athletic, and healthy looking body, yet in combination with resistance work-out myofibril damage and rhabdomyolysis were observed. Nowadays anabolic compounds are the third most commonly used drugs behind cannabis and amphetamines. Although metandienone (Dianabol<sup>®</sup>) has been banned since 1987 in most West European countries and the USA, the illicit drug comes to the European market from Eastern Europe or South East Asia. The anabolic black market is a lucrative commercial business.

We would like to report about a patient with acute cholestasis associated with muscle damage and degenerative changes of the lumbar spine, who used metandienone as an anabolic steroid.

### Case report

A healthy 24-year-old man was admitted to the Emergency Department with symptoms of a sudden left-side flank pain. He was a body builder. Physical examination revealed pain on touch and movement and his left side showed a swelling. Both kidneys were slightly increased in length up to 12 cm as was detected by ultrasonography. The medical history did not show any evidence of liver disease or adverse drug reactions. Clinical details and biochemical findings are represented in the Table 1. The taking of anabolic steroids was proven as metandienone could be detected in urine by gaschromatography/massspectrometry. The anamnestic information revealed a daily intake of 8-12 tablets of 5 mg metandienone since 8 weeks.

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Tab. 1 : Clinical and biochemical profile of a body builder using metandienone

Parameter	Result	Reference range
blood pressure	160/80 mm Hg	120/80 mm Hg
heart rate	80 bpm	60 bpm
total bilirubin	22.6 $\mu\text{mol/l}$	< 17 $\mu\text{mol/l}$
direct bilirubin	6.1 $\mu\text{mol/l}$	< 5 $\mu\text{mol/l}$
ALAT	2.6 $\mu\text{mol/sl}$	0.22 - 0.67 $\mu\text{mol/sl}$
ASAT	4.1 $\mu\text{mol/sl}$	< 0.62 $\mu\text{mol/sl}$
AP	2.0 $\mu\text{mol/sl}$	1.5 - 4.3 $\mu\text{mol/sl}$
GGT	0.38 $\mu\text{mol/sl}$	< 0.82 $\mu\text{mol/sl}$
LDH	48.8 $\mu\text{mol/sl}$	3.8 - 7.7 $\mu\text{mol/sl}$
CK	24.2 $\mu\text{mol/sl}$	< 3.25 $\mu\text{mol/sl}$
Creatinine	138 $\mu\text{mol/l}$	50-100 $\mu\text{Mol/l}$
Myoglobin	560 $\mu\text{g/l}$	< 90 $\mu\text{g/l}$
CRP	61.7 $\text{mg/l}$	< 5 $\text{mg/l}$
Leukocytes	15.7 GPT/l	< 10 GPT/l

*Abbreviations:* ALAT - alanine aminotransferase, ASAT - aspartate aminotransferase, AP- alkaline phosphatase, GGT -  $\gamma$ -glutamyltransferase, CK - creatine kinase, CRP - C-reactive protein, LDH - lactate dehydrogenase, GPT - giga particles per litre.

## Discussion

During the last years there has been a dramatic increase in the non-therapeutic use of anabolic steroids in semi-professional competitive and in popular sports. Especially C-17 alkylated anabolic steroids such as metandienone cause severe hepatic dysfunction. The mechanisms by which these drugs cause deleterious effects remain unclear. Specific targets for cholestasis-inducing steroids are bile acid transporters. Drugs can interfere with bile acid uptake and intrahepatic transport, causing disturbances of the canalicular secretion. We conclude that the high dose application of more than 50 mg per day was responsible for the mixed cholangiolitic and hepatic changes seen by the elevated levels of serum ALAT and ASAT. The levels of GGT and AP were normal. The doses of anabolic androgenic steroid taken was, in pharmacological sense, very high, i.e. ten times the prescribed for androgen substitution. Additionally a muscle damage should be considered if the elevated CK and creatinine levels are found. The increase of C reactive protein confirms an inflammable reaction of the liver. Taking anabolic steroids and intense resistance training regimes cause myofibril damage and an increased production of free radicals, that is followed by the increase of the membrane permeability, resulting in enzyme leakage. Steroid users show a markedly increased level of ALAT, ASAT, CK, and creatinine compared with steroid non-users [1]. Exertional rhabdomyolysis accompanied by myoglobinuria, and an elevated serum creatine kinase level is reported for one body builder who was taking anabolic steroids [2]. Likewise renal impairment is a possible complication of cholestasis. Renal failure was reported in a patient due to consumption of high doses of AAS and  $\beta_2$ -adrenoceptor agonists clenbuterol [3]. In spite of increased levels of myoglobin, lactate dehydrogenase, and creatine kinase we did not observe any signs for rhabdomyolysis. Further reported negative effects of AAS in bodybuilders include an increase in coronary risk factors, cardiomyopathy, acute myocardial infarction, and severe mood and psychotic disorders [4, 5]. Management of steroid-induced cholestatic liver damage requires

prompt withdrawal of the anabolic steroid. Therapeutic strategies in severe cases of cholestasis include application of ursodeoxycholic acid, although there are no controlled trials to validate its use for this purpose [6].

Even in popular sports, a widespread abuse of doping substances exists. The fitness boom has also produced an increasing number of steroid users, who have only a sophisticated knowledge of steroid pharmacology. After opening the borders to the East European black-market, the risk of drug abuse in the young generation has dramatically increased.

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## **Postgradualstudium Toxikologie und Umweltschutz**

### **an der Universität Leipzig**

An der Universität Leipzig beginnt im **Anfang September 2006 die zehnte Matrikel** des Postgradualstudiums Toxikologie und Umweltschutz, das als Aufbaustudium mit Fernstudiencharakter Akademikern (Pharmazeuten, Chemikern, Biochemikern, Biologen, Landwirtschaftlern, Ärzte und Absolventen adäquater Ingenieurfächer) in 5 Semestern ein breites Spektrum toxikologischer und ökologischer Kenntnisse vermittelt.

Das ministeriell bestätigte **Studienprogramm** besteht aus 11 einwöchigen Intensivlehrgängen im Zeitraum von 4 Semestern, zwischen denen zusätzlich Selbststudium mit empfohlener Literatur und ausgehändigten Lehrmaterialien erfolgt. Darüber hinaus bieten wir die Möglichkeit eines die Präsenzkurse ergänzenden virtuellen Studiums an. Dies gibt den Kursteilnehmern die Möglichkeit im Selbststudium sich anhand von Lernsoftware toxikologischer Inhalte zu erarbeiten. Das Gesamtprogramm ist berufsbegleitend konzipiert. Nach den Wochenlehrgängen sind im jeweils folgenden Lehrgang schriftliche Klausuren abzulegen. Am Ende erhalten die Teilnehmer nach einer Abschlussarbeit und dem mündlichen Examen vor einer Prüfungskommission ein Zeugnis über die erfolgreiche Teilnahme und eine Urkunde, die zur Führung des Zusatzes zur vorher erworbenen Berufsbezeichnung "Fach... für Toxikologie" berechtigt.

**Hauptziel** ist die Vermittlung einer breiten Grundlage toxikologischen Wissens zur Erleichterung der interdisziplinären Zusammenarbeit und zur rascheren Einarbeitung in toxikologisch orientierte Spezialgebiete.

**Die Koordination und Durchführung des Programms** liegen bei Prof. Dr. J.G. Hengstler, Prof. Dr. R.K. Müller und Frau DI A.Graefe, Institut für Rechtsmedizin, PGS Toxikologie der Universität Leipzig, Johannisallee 28, 04103 Leipzig.

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