SIDE EFFECTS

The clinical side effects of anabolic steroids can be listed according to organ systems.

ORGAN SYSTEM	SIDE-EFFECT
Cardiovascular	Coronary artery disease, cardiomyopathy, hypertension, ventricular hypertrophy, decreased cardiac function, cardiac fibrosis, arrhythmias
Dermatologic	Acne vulgaris, crusted skin, nasal excoriation, dermatitis, pruritus
Metabolic	Decreased HDL:LDL ratio, hypokalaemia, increased triglycerides
Endocrine	Elevated TSH and estradiol, decreased libido, gynecomastia, hair loss
Gastrointestinal	Gingivitis, increased bilirubin, abnormal hepatic function, dysgeusia, gastroesophageal reflux
Genitourinary	Increased PSA, BPH, testicular atrophy, infertility (due to oligospermia and erectile dysfunction), mastalgia, hypogonadism, prostatitis, dysuria, haematuria, impotence, urinary incontinence ((nandrolone).[67]
Hematologic / Oncologic	Polycythaemia, prostate carcinoma, hypercoagulability and impaired fibrinolysis.
Hepatic	Abnormal liver function and malignant transformation of benign hepatic neoplasms.
Neuromuscular	Myalgia, premature epiphyseal closure (taken before completion of puberty), tendon rupture, abnormal bone growth and hemarthrosis, eye and hearing disturbances.
Neuropsychiatric	Emotional lability, mood disorders, anosmia, anxiety, headache, dementia, insomnia, aggression.

CONCLUSIONS

Anabolic steroids, like all steroids, have a place in pharmacology. The trick is judicious use, and of course, no health care worker would recommend recreational use. As a hormone replacement therapy, this is particularly tricky, especially if there is a normal testosterone level and the patient demands it because of the perceived benefits for ageing, etc. I guess this is dealt with on a case-by-case basis, but good clinical judgement is always important.

Coming back to how to respond to situations like the one I found myself in at the start of this newsletter. Well, I still don't know what the best course of action was, but it was probably not a physical confrontation. And if that is the endgame, at least be a fast runner.

References on request

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LAB INSIDER

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This happened a couple of years ago, but I remember it clearly. Not only because it reminded me of the medical issue, but also because the way I handled the situation wasn't, as they say in corporate-speak, 'ideal'.

I was jogging (I am unfortunately a jogger, not a runner) on one of the suburban roads in Johannesburg when a minibus taxi stopped to discharge staff working at a nearby shopping centre. In his defence, the taxi driver tried to pull onto the shoulder. There wasn't much space, however, so he obstructed traffic and behind it was one of those double-cab SUVs, you know the ones that sit high off the ground; you see them all over northern Johannesburg. The passenger window of the SUV was open, and the driver let fly a barrage of racial slurs. Without thinking, I stuck my head in the window and shot off a few choice words of my own. It was then I noticed the man was twice my size and built like a Sherman tank.

He had shaved his balding head, which made him look even more menacing, and there were stretch marks over the mountains that were his thighs and biceps. And the acne? Another sign of anabolic steroid use. I didn't think much about the side-effects of steroids, but had I done so, I might have anticipated his response. Another side-effect: 'roid-rage' as those in the know call it.

He was apoplectic with anger at my meddling, and after a few more exchanges, he flung open the door. He was set on teaching me a lesson. Now I know I am only a jogger, not a runner, but it was one area where I thought I could compete, admittedly from a very low bar. For a while, he tried to keep up, rumbling along the sidewalk after me like a demented buffalo with an exploding plum for a head. Having escaped, I promised myself I would write something about anabolic steroids at some stage, and so here we are.

WHAT ARE ANABOLIC STEROIDS?

The hormone testosterone was isolated in 1935, and its synthetic derivatives are what we loosely call anabolic steroids, or androgenic steroids, because they have both anabolic and androgenic effects. The anabolic part refers to the cellular activities following receptor binding, androgenic refers specifically to the development of masculine characteristics.

There are two broad classes based on their organic structure; the ester derivatives are more commonly used (legally and illegally). They have various routes of administration and differ in frequency of administration, dosage, side effects, half-life, metabolism, etc.

PATHOLOGY INVESTIGATIONS & INDICATIONS FOR TESTOSTERONE REPLACEMENT

Before starting testosterone therapy, there is a recommended pathology panel. This is important for monitoring and titrating the dose against clinical response and, perhaps more importantly, checking for metabolic side-effects.

RECOMMENDED BASELINE PATHOLOGY	COMMENTS
Total and free testosterone	Morning sample preferred to confirm low level
Full blood count	Monitoring Hct and Hb levels and cell counts
Metabolic screen	LFTs, U&E&creatinine, lipogram, fasting glucose & insulin
Prostate activity	PSA
Other endocrinology	Estradiol, TSH, SHBG, prolactin

Following the initiation of testosterone replacement, pathology investigation is recommended one month later and then every 3 to 6 months as required. Monitoring of the following analytes and parameters is particularly important, as well as any others based on the clinical situation: total and free testosterone, Hb and Hct, PSA, Estradiol, a metabolic screen (lipogram, U&E&creatinine, glucose and insulin, LFTs, TSH). In addition, blood pressure monitoring is essential.

INDICATIONS

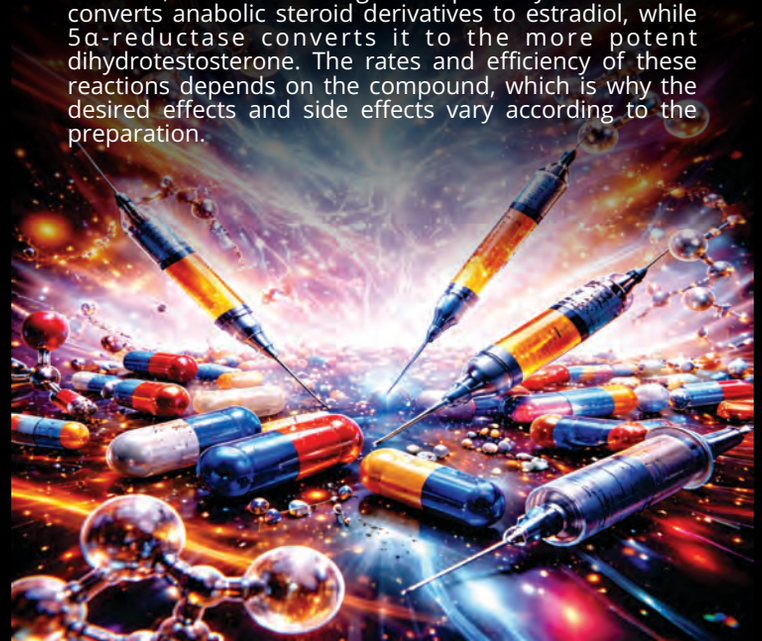
Testosterone replacement therapy (TRT) is indicated for a range of conditions. These are, as expected, almost all related to conditions that cause a testosterone deficiency and include primary hypogonadism and (male) delayed puberty in boys, hypogonadotropic hypogonadism, luteinizing hormone deficiency, and pituitary-hypothalamic axis dysfunction. Other conditions include cryptorchidism, orchitis, testicular torsion, vanishing testis syndrome, orchidectomy, chemotherapy, alcohol and other toxins, as well as genetic conditions like Klinefelter syndrome and Kallman syndrome. Possibly the commonest reason for TRT is an incidental (often age-related) finding of low testosterone or the patient requesting it. There are also many so-called off-label uses like loss of appetite, muscle atrophy in malignancy, bone marrow failure and many others.

CONTRAINDICATIONS

Testosterone supplements are contraindicated in the presence of severe renal, cardiac, and hepatic disease, men with breast or prostate cancer, venous thromboembolism, pregnant women, women who may become pregnant, breastfeeding mothers, and hypersensitivity to any component of the formulation. New contraindications crop up from time to time, and consulting the latest literature is recommended.

DRUG METABOLISM

The metabolism of anabolic steroid derivatives is complex; however, there are two general pathways. Aromatase converts anabolic steroid derivatives to estradiol, while 5α-reductase converts it to the more potent dihydrotestosterone. The rates and efficiency of these reactions depends on the compound, which is why the desired effects and side effects vary according to the preparation.



ANABOLIC STEROID ABUSE

Anabolic steroids can make an enormous difference to athletic performance and are therefore almost always illegal in professional sports. Despite this, usage is staggeringly high and periods of going clean mean that users may get away with taking them. They are also a major problem in recreational sports and tough-guy professions (bouncers, security guards). In developed countries, a significant proportion of users are young to middle-aged men who report that testosterone simply makes them 'feel better', contributes to fat loss or helps them live a 'high-end' lifestyle. This is probably also the case in South Africa.

The reason for the high incidence of recreational use in gyms is, in short, that the results are so noticeable. In as little as six weeks, there may be an increase in muscle mass, fat loss, and the self-confidence that comes with that. What's more, testosterone derivatives are so easily available, and they are marketed aggressively.

As mentioned earlier, anabolic steroids have both anabolic and androgenic effects, and the ratio depends on the kind of derivative used. This is why, for example, nandrolone was so popular in bodybuilding when it first became available, because it had a greater anabolic as opposed to androgenic effect.

All drugs come with side effects, and the reason testosterone is tightly regulated (or at least that is the aim) is because of the harm to the user and those who come into contact with them (consider what may have happened to me if I couldn't run faster than the bodybuilder in his SUV).