

## ***"Ecdysteroids as non-conventional anabolic agents: Pharmacodynamics, pharmacokinetics, and detection of ecdysterone"***

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### **Project Overview:**

Increasing numbers of dietary supplements with ecdysteroids are marketed as "natural anabolic agents". Their advertisements promise to increase strength and muscle mass during resistance training, to reduce fatigue and to ease recovery. Several studies have reported a wide range of pharmacological effects of ecdysteroids in mammals, most of them beneficial to the organism. The most active phytoecdysteroid, ecdysterone (a "Russian secret"), was already suspected to be used by Russian Olympic athletes since the 1980s. Extensive investigations on the possible growth-promoting effects of ecdysterone in various animal species (rats, mice, Japanese quail and cattle) were reported.

Recent studies suggest that the anabolic effect of ecdysterone is mediated by estrogen receptor (ER) binding. In comparison to the prohibited anabolic agents (e.g. metandienone and others) ecdysterone revealed to be even more effective in a recent study. However, scientific studies in humans are very rarely accessible.

Thus, our project aims at investigating the effects of ecdysterone containing products on human athletic performance. A 12-week intervention study in young man will be conducted including regular resistance training for all volunteers. Different doses of ecdysterone containing supplements will be administered during the study to evaluate the performance enhancing effect. Analysis of blood and urine samples for ecdysterone and potential biomarkers of performance enhancement will be conducted.

To exclude underlying effects by contamination of the supplement or adulteration of the results by administration of other anabolic agents regular screening for prohibited compounds is included in the project. Furthermore, the administered supplements will be tested for the absence of anabolic steroid contaminations.

### **Results and Conclusions:**

Increasing numbers of dietary supplements with ecdysteroids are marketed as "natural anabolic agents". Their advertisements promise to increase strength and muscle mass during resistance training, to reduce fatigue and to ease recovery. Several studies have reported a wide range of pharmacological effects of ecdysteroids in mammals, most of them beneficial to the organism. The most active phytoecdysteroid, ecdysterone (a "Russian secret"), was already suspected to be used by Russian Olympic athletes since the 1980s.

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Recent studies suggest that the anabolic effect of ecdysterone is mediated by estrogen receptor (ER) binding. In comparison to the prohibited anabolic agents (e.g. metandienone and others) ecdysterone revealed to be even more effective in a recent study performed in rats. However, scientific studies in humans are very rarely accessible.

Thus, our project aimed at investigating the effects of ecdysterone containing products on human athletic performance. A ten-week intervention study in young man has been conducted including regular resistance training for all volunteers. Different doses of ecdysterone containing supplements have been administered during the study to evaluate the performance enhancing effect. Analyses of blood and urine samples for ecdysterone and potential biomarkers of performance enhancement have been conducted.

To exclude underlying effects by contamination of the supplement or adulteration of the results by administration of other anabolic agents screening for prohibited compounds was also performed. Furthermore, the administered supplements have been tested for the absence of anabolic steroid contaminations prior to administration.

The ecdysterone administration led to increased serum IGF1 concentrations in comparison to the control group while thyroxin (T4) concentrations decreased.

Significantly higher increases in muscle mass were observed in those volunteers that were dosed with the ecdysterone supplements. Even more relevant with respect to sports performance, also significantly more pronounced increases in one-repetition bench press performance were observed.

These data underline the effectivity of an ecdysterone supplementation with respect to sports performance. We therefore strongly recommend to include ecdysterone in the List of Prohibited Substances and Methods in sports to improve clean competition in the future. As the exact mechanism of action is not yet fully understood, we suggest to include it in class S1.2 "other anabolic agents".

## **References**

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