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German athletes with naturally elevated T/E - evaluation of follow up studies

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Abstract

Corresponding to the WADA Athlete Biological Passport, doping control urine samples originating from German athletes are systematically followed up by long-term target testing since 2008. Steroid profiles of the triggering samples are compared with previously and prospectively collected specimens of the athlete in addition to GC/C/IRMS analysis and determination of ethylglucuronid. Between 2008 and 2012 due to long-term studies in 190 athletes a naturally elevated T/E was found. Based on a total number of 18,650 samples, this corresponds to 1%. The number of long-term studies triggered by athletes with naturally elevated T/E ratio remains constant in the course of time. This is probably due to the continuous regeneration of the athletes squad.

Introduction

Since 2008, German athletes showing $T/E > 4$ are subjected to systematic follow-up analyses by long-term target testing. Follow-up studies correspond to the Athlete Biological Passport, as intended by WADA. Steroid profiles of the triggering sample are compared with previously and prospectively collected specimens of the athlete in addition to GC/C/IRMS analysis and determination of ethyl glucuronide. Any long-term study is linked with a case number. The most common result of a long-term study is the finding of a naturally elevated T/E ratio. The aim of the study is to test if the number of newly added long-term studies decreases within the time course of the years.

Experimental

Between 2008 and 2012, steroid profiles of 18,650 German out of competition doping control samples were determined by means of common procedures [1-3]. Each sample with a $T/E > 4$ triggered a follow up study, which was completed with the result "naturally elevated T/E", if the following conditions were met:

- Four samples with consistent steroid profiles
- A sample with negative IRMS result and two additional samples with consistent steroid profiles
- Two samples with negative IRMS results and consistent steroid profiles

Results and Discussion

Between 2008 and 2012, 190 athletes were classified as individuals with naturally elevated T/E ratios, due to long-term studies. Based on a total number of 18,650 samples, this corresponds to 1%. Most of the European doping control laboratories have to expect about 1% of specimens with naturally elevated T/E - thus triggering a costly long-term study. In laboratories with predominantly Asian athletes this percentage will be significantly lower due to the UGT2B17 polymorphism [4].

Table 1 shows the number of athletes with naturally elevated T/E per year. In 2008 (starting point of the long time monitoring of steroid profiles) the amount of athletes with naturally elevated T/E was 1.56%. 2009 and 2010 there was a decrease to 0.85, respectively 0.65%. In 2011 and 2012 the percentage was approx 1%. Cases showing an elevated T/E and ethyl glucuronide > 0.5 µg/mL (where ethanol consumption is most probably the source of the elevated T/E) are not included.

Year	Total number of samples	Newly added athletes with naturally elevated T/E	Newly added athletes with naturally elevated T/E [%]
2008	3646	57	1.56
2009	3881	33	0.85
2010	3685	24	0.65
2011	3844	42	1.09
2012	3594	34	0.95
Total	18,650	190	1.02

Table1: Number of newly added athletes per year with naturally elevated T/E, which triggered a long-term study

Population	Sport discipline
Endurance	Cycling (16), rowing (13), triathlon (9), skating (8), canoe (6), skiing (6), swimming (4)
Strength, martial arts	Karate (4), wrestling (3), weightlifting (2), taekwondo (2), judo (2), ju jitsu (1)
Team sports	Soccer (15), icehockey (8), basketball (5), volleyball (5), hockey (5), rugby (1), baseball (4), handball (2), tennis (1), rugby (1), beachvolleyball (1), badminton (1), american football (1)
Misc	Athletics (15), gymnastic (4), shooting (3), bobsledding (3), dancing (3), water skiing (2), sailing (2), golf (2), acrobatics (1), fencing (1), curling (1), motorcycle racing (1), equestrian (1)

(number of cases with naturally elevated T/E in brackets)

Table 2: Summary of populations and corresponding sport disciplines

Conclusions

The number of long-term studies triggered by athletes with naturally elevated T/E ratios remains constant in the course of time. This is probably due to the constant regeneration of the athletes squad.

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