

“Subject-based profiling for the detection of lower dose testosterone administration in sport investigating the value of serum”

A. Kicman, D. Cowan (King's College London, UK), **U. Stenman, P. Teale** (Helsinki University, Finland)

Result and Conclusion

This study attempts to reveal whether within individual serum testosterone concentrations might be sufficiently stable biologically in the normal individual to provide a useful marker to add to the athlete biological passport to evidence anabolic steroid administration.

The study required the design and validation of a suitable analytical method based on LC-MS/MS instrumentation initially to be able to measure serum testosterone from blood samples collected from male sports competitors.

Blood and urine samples were collected from the competitors by UK Anti-Doping Ltd (UKAD) trained doping control officers in accordance with WADA protocols. Generally the samples were collected out of competition on multiple occasions from the same competitors in order to be able to assess any change of the values over time. The competitors were selected by UKAD as part of their normal process but, in particular, because these competitors had previously been shown to have more variable urinary testosterone to epitestosterone ratios (T/E) than the more normal 30 % limit for males. The laboratory was blinded to the identity of the competitors and were not provided with any further information about the extent of any exercise undertaken by the competitors immediately prior to sample collection. Data was obtained from 15 different competitors.

We found that the urinary T/E in the cohort studied had a variation over time (CV%) greater than 30 % in 7 out of the 15 cases investigated. We consider that it is reasonable to assume that these individuals may also have a greater variability in their serum testosterone concentrations. Indeed we found that these athletes had an equivalent CV% for their within subject serum testosterone concentrations greater than 30 % in 11 out of the 15 cases investigated. However, these values were not clearly correlated between serum and urine although five exceeded 30 % for both serum testosterone concentrations and urinary T/E.

The ABP software provided a useful tool for evaluating the data enabling us readily to assess the sensitivity of the method, i.e. at what point would an athlete be shown to be “abnormal”. No sample exceeded the calculated limits nor did any sample exceed the normal male reference interval.

It is likely that a cheating athlete would need to administer sufficient testosterone to overcome their normal endocrine homeostasis that would simply reduce endogenous production when the serum testosterone is greater than the norm for that individual.

The fact that we have evaluated a cohort selected on their larger than normal variability in urinary T/E gives us reason to believe that the majority of the population would fit well within the model that we have used. Thus the results indicated to us that serum testosterone measurements may be a useful part of a steroid passport scheme. An administration study would be required to confirm this assertion.
