PROJECT REVIEW

"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)

Cheaters in sport commonly use testosterone for anabolic purposes, not least because it is more difficult to detect such doping with a steroid that is also produced naturally in the body. It is suspected that lower doses of testosterone are often administered, particularly formulations designed for daily use, such as hydroalcoholic gels, so that users can rapidly clear the drug from their bodies in anticipation of a drug test. An increasing number of blood samples are now being taken to detect transfusion and growth hormone administration and this also permits the analysis of testosterone for profiling. Serum analysis has an advantage over urine in that the concentration of testosterone should be relatively constant in 'clean' athletes. By contrast, administration of low doses of testosterone does raise serum testosterone but this may not exceed the upper limit of normal for men in every case. However, proving that an increase in serum testosterone is uncharacteristic in men and women should enable detection of low-dose administration.

Methods will be developed to enable the accurate measurement of testosterone in a small volume of blood serum using a gold-standard approach of liquid chromatography-mass spectrometry. The natural variation in the profile of serum testosterone in male and female athletes will be monitored over a year to assess whether the concentration of serum testosterone within each subject is sufficiently stable to be worthy as a biomarker for evidential analysis (athlete passport Bayesian approach). Once established, further funding will be sought to validate the effectiveness of the approach by administering small doses of testosterone to volunteers that are not competing in sports. The approach should provide a more sensitive method for the detection of doping with testosterone than that provided by urine analysis alone.