Project Review

"Development of a web-based tool for the forensic evaluation of any longitudinal marker of doping"

M. Saugy (Laboratoire Suisse d'Analyses du Dopage, Switzerland)

Natural variability of endogenous substances in the body complicates the evaluation of the evidence with indirect markers of doping. Currently, reference ranges of markers of doping are derived from the analysis of data obtained from a large number of athletes. Unfortunately, such population-based thresholds induce a lack of sensitivity for many markers, because they do not take into account the large heterogeneity that exists among professional athletes. For example, when the hematocrit is used as an indirect marker of blood doping, a threshold at 50% lets a margin large enough to athletes with naturally low levels (ex: 39%) to abuse from rhEPO or blood transfusions. In the same way, a limit at 4.0 or 6.0 for the ratio of testosterone over epitestosterone lets a margin large enough to the majority of male athletes to monitor their steroid profiles below this limit via the intake of exogenous testosterone.

It has been shown recently that the combination of subject-based information, such as ethnical origin, gender, age or previous individual readings of the marker, with traditional population-based data can significantly enhance the sensitivity of most markers of doping (T/E, haemoglobin, ABPS,…). The approach used to integrate these different sources of information is based on Bayesian inference methods, and shares strong similarities with state-of-the-art approaches for the early detection of cancer.

The aim of this project is to make this approach available to the anti-doping authorities for better decision making with any marker of doping.

"Development of a web-based tool for the forensic evaluation of any longitudinal marker of doping"

M. Saugy (Laboratoire Suisse d'Analyses du Dopage, Switzerland)

Results and Conclusions

The application called "Athlete Biological Passport Software" (ABP software) has been created. The ABP software is made freely available to any antidoping organization. The software has been distributed to some anti-doping organizations (sports federations, national anti-doping agencies, WADA accredited laboratories) and to the experts in charge of the evaluation of the haematological profiles during the ABP pilot project.

The ABP software is divided into five main sections, with each section accessible through a dedicated data sheet: *Athlete, Haematology, Endocrinology, Models, Results.*

Publications

1. A forensic approach to the interpretation of blood doping markers. Sottas PE, Robinson N, Niggli O, Saugy M. Law, Probability and Risk 7:191-210 2008.

2. Les marqueurs indirects du dopage sanguin. Sottas PE, Robinson N, Saugy M. Revue Francophone des Laboratoires 401 : 27-38 2008.

3. The Athlete's biological passport and indirect markers of blood doping. Sottas PE, Robinson N, Saugy M., In press in the Handbook of Experimental Pharmacology