Drug Testing and Analysis

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The 29th Manfred Donike Workshop on Doping Analysis

The 29th Cologne Workshop on Doping Analysis was held from 7–11 March 2011 at the Institute of Biochemistry, German Sports University. Organized since 1983, the meeting is the most important yearly opportunity to present, share, and absorb relevant scientific progress in the field of doping analysis. After the death of Professor Manfred Donike,[1] the founder of this workshop, in 1995, his name in the header of the conference reminds us of his merits in doping analysis and his ambitions for the quality of 'his' workshop.

Doping analysis is a highly dynamic field of research due to permanent changes both in the World Anti-Doping Agency's Prohibited List and scientific developments in pharmacology, pharmacy, medicine, biochemistry, or other areas that may influence an athlete's performance in sport. Increased knowledge of doping agents and their pharmacokinetics contributes to the legal security of athletes.[2] Furthermore, state-of-the-art analytical methodology requires constant progress in, for example, the sensitivity of methods, their specificity, and their effectiveness.

The analytical methods become more and more effective through the development of chromatographic and mass spectrometric analytical technology. Improved analytical selectivity through MS^n detection techniques using 'dilute-and-shoot' approaches has reduced the time needed for sample preparation.[3] Both two-dimensional gas chromatography and fast quadrupole mass spectrometry have been tested for their potential application in doping analysis.[4]

The detection of doping with recombinant human erythropoietin (rhEPO) and analogues is based on the differences in glycosylation of the endogenous and recombinant glycoprotein. Newly discovered differences[5] might still prove useful for anti-doping testing and even future EPO drug development. Furthermore, the established electrophoretic detection methods have to be tested for new rhEPO biosimilars.[6] A truly preventive anti-doping approach is the development of detection methods for possible new substances, such as hypoxia inducible factor (HIF) stabilizers, that increase erythropoiesis.[7] The discovery of possible indirect markers, like circulating microRNAs, for the misuse of erythropoiesis-stimulating agents[8] will provide a welcome alternative to the direct identification of doping agents in body fluids.

Enhancement of oxygen transfer can be achieved by stimulating erythropoiesis or directly by autologuous and non-autologuous blood transfusions. Especially, the disclosure of autologuous blood transfusions has been a major analytical challenge. An indirect approach is to monitor phthalate metabolites in urine, but more needs to be learnt about natural exposure and its variations.[9]

Differentiating between endogenous and exogenous testosterone has been based on isotope ratio mass spectrometry (IRMS) measurements. It is therefore of utmost importance to continue investigating and filing the $^{13}C/^{12}C$ ratios of available testosterone preparations. [10] Complementary to IRMS, studying the endogenous steroid profile has provided us with the means to reveal doping with testosterone and testosterone-related substances. New metabolites and ratios of metabolite concentrations have been proposed[11] and further studies have been performed on substances that may influence steroid profiles.[12]

In view of all this progress, and other recent developments, there should be good reason to look forward full of expectation to the 30th Manfred Donike Workshop on Doping Analysis in early spring 2012.

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