PROJECT REVIEW

"New challenges in insulin detection; liposome-vehiculated insulins"

Pr. F. Botrè, Pr. X. de la Torre, Pr. F. Donati (Federazione Medico Sportiva Italiana, Italy)

Liposome-vehiculated insulins (LVIs) are a class of insulins not yet officially marketed that should allow the intake of insulins by non-invasive routes (i.e. orally and by inhalation). This class of products, at present officially available only as prototypes, have been designed to optimize the pharmacokinetic properties of recombinant insulins produced for therapeutic uses, with the aim of developing insulin-based pharmaceutical preparations to be administered also by non-invasive routes (i.e. orally or by inhalation), but could in principle be illicitly abused also as doping agents in sport. As such, LVIs fall into two classes of the 2013 WADA Prohibited List International Standard, that are class "S0" ("Non approved substances") and class "S2" ("Peptide Hormones, Growth Factors and Related Substances"). We therefore plan to develop a specifically designed analytical strategy to detect the administration of LVIs by the analysis of biological fluids. We expect that two parallel analytical procedures may be necessary, and specifically (i) a flow cytofluorimetric method capable of identifying the presence of intact or poorly biotransformed LVIs in blood matrices (whole blood, plasma, serum) and (ii) a LC-MS/MS based method for the profiling of the breakdown products (mainly phospholipids and sphingomyelins) of liposomes, excreted in urine. In addition to this, we also plan to investigate whether liposomes themselves, either as components of LVIs preparations and/or as "free" drug delivery systems, can interfere with the procedures currently followed within the network of WADA accredited laboratories for the detection of the intake of non endogenous insulins (and as such falling into the class "M2. Chemical and Physical Manipulation" of the WADA prohibited list).