

# LC-HRMS BASED METABOLOMIC APPROACH AS A SCREENING TOOL IN HORSE RACING DOPING CONTROL

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Implementation of mass spectrometry in doping control improved considerably sensitivity and selectivity/specificity of existing screening methods. Most of qualitative and/or quantitative measures and identifications of prohibited compounds are achieved with chromatographic/mass spectrometric means. However, most of these methods are based on target analysis of known compounds and approved therapeutics, and even small modification in chemical structure of substances (*e.g.* designer drugs), results with void analysis. Furthermore, direct detection of the administration of “endogenous-like” substances, such as some androgenic anabolic steroids or a full set of peptide hormones (*e.g.* GH, IGF-1, EPO) is still difficult. In this context, OMICS methods promise a pertinent alternative to direct detection of the doping substance abuse, with emphasis on the metabolomic approach, the final “omic” level in a biological system. Metabolomics is a comprehensive analytical approach that is nonselective and ubiquitous, with an aim to identify and quantify all metabolites of a biological system usually below 1000 Da (“small molecules”). With recent significant advances in liquid-chromatography/high-resolution mass spectrometry (LC-HRMS) instrumentation, the simultaneous monitoring of all metabolites capable to be ionized under atmospheric pressure ionization (API) conditions, can be performed.

In this context, LCH, the French horse doping control laboratory conducts several metabolomic projects in order to advance screening tools. Some of them are already applied in longitudinal profiling of fifty best French trotters (metabolomic profiling for reGH / rpGH / IGF-1 abuse) and others are at development stage. Principals and method development of metabolomic approach dedicated to horse doping control will be presented through the case of anabolic steroids administration with special attention to some critical steps such as sample preparation, confounding factors, statistical analysis and biomarker structural elucidation.

The potential of non-targeted metabolomics, as powerful screening tool, is encouraging and gives large-scale opportunities in discovering novel and/or emerging drugs.