

ADVANCES, CHALLENGES AND FUTURE PERSPECTIVES IN MICROSAMPLING-BASED BIOANALYSIS

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Lecture abstract

There is a growing interest in the design, development and implementation of miniaturised approaches for the determination of prescription drugs, drugs of abuse, doping agents, metabolites and biomarkers in biological samples involved in a wide range of applications and frameworks. This interest is due to the ethical advantages of sampling minute amounts of biological matrices, particularly for those studies performed in delicate populations and in the framework of patient-centric approaches. Moreover, these advanced technologies facilitate sampling to be performed in locations usually difficult to be reached, and allow for feasible, straightforward and time- and cost-effective analytical protocols. This lecture gives a comprehensive overview about optimisation and implementation processes of cutting-edge sampling, pretreatment and analysis strategies in bioanalytical method development and application. In particular, the research group of Pharmaco-Toxicological Analysis (PTA Lab) of Alma Mater Studiorum - University of Bologna (Italy) recently designed and developed a panel of novel, miniaturised protocols to be applied for the determination of central nervous system drugs, drugs of and doping agents. The microsampling approaches fully designed and developed by PTA Lab include capillary volumetric blood microsampling, volumetric absorptive technologies and microfluidic platforms. These allow not only to collect microvolumes of biological matrices (including hematic samples, urine and oral fluid) in an accurate manner regardless of fluid density, but also to guarantee sample integrity, subject compliance and feasible, yet effective, pre-analytical and analytical steps. A comparative evaluation of procedures and techniques offering peculiarities, advantages and challenges will be presented and could guide attendees towards the best miniaturisation choice in relation to the different bioanalytical application scenarios.