Forensic toxicology

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Forensic toxicology is a discipline of analytical toxicology dedicated to toxicological problems of forensic relevance, for example driving under the influence of alcohol or drugs, or postmortem toxicology. High-quality analytical methods for identification and quantification of drugs, poisons, and/or their metabolites in complex matrices, for example body fluids or hair, are very important in forensic toxicology. However, it must not be forgotten that the correct interpretation of the generated analytical data is just as important. Because new drugs and drugs of abuse are always becoming available, and because of ever more sophisticated analytical hardware and software, forensic toxicology is constantly changing. This special issue is dedicated to reports on the most recent developments in this and related fields.

Some of these developments relate to sample preparation, the most obvious being a trend to on-line solid-phase

extraction (SPE) procedures directly connecting extraction with liquid chromatography. However, there are also applications of new off-line SPE tools, for example monolithic spin columns. With regard to analytical methodology, it is remarkable that the newly developed methods described in this issue almost exclusively employ liquid chromatography coupled to (tandem) mass spectrometry (LC–MS(–MS)). On the one hand, there is a continuing trend to LC–MS(–MS) assays enabling simultaneous quantification of several drugs, either because of structural similarity, for example the benzodiazepines, or because they often occur simultaneously in the same samples, for example drugs of abuse. On the other hand, LC–MS is being increasingly used in systematic toxicological analysis, which has long been dominated by gas chromatography–mass spectrometry. A common feature of the LC–MS(–MS)-based screening methods described in this issue is that compound identification is based on information-rich MSⁿ mass spectra, which overcomes an important drawback of the single-stage mass spectra from the early days of LC–MS, which often contained comparatively little spectral information.

Blood and urine have remained the most prevalent matrices, but three of the papers included are dedicated to analysis of hair, an important alternative matrix for demonstrating long-term or past exposure to drugs. Another is dedicated to analysis of sweat, which can also be used to monitor long-term drug exposure if collected in so-called sweat patches. Three papers reflect the increasing interest in monitoring the alcohol markers ethyl glucuronide, ethyl sulfate, and fatty acid ethyl esters (FAEE) in urine and/or hair. Other recent analytes of interest are the so-called “legal highs”, i.e., new drugs of abuse not covered by controlled substance legislation. Some of these “legal highs” are of herbal origin, for example preparations of the psychoactive plants kratom (*Mitragyna speciosa* Korth.), others are pharmacologically

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inactive herbs laced with synthetic cannabinoids (“Spice”) or more classic drug products, for example capsules or pills containing new designer drugs. Moreover, the trend to using new drugs is also relevant to doping analysis, as illustrated in another paper in this special issue. Finally, interpretative issues and pitfalls in forensic toxicology are addressed. One example is a study on pharmacokinetic interactions between alcohol and cannabinoids. Another is a study of the effect of hair-care products on concentrations of FAEE in hair.

Altogether, this special issue should be a valuable source of information for all readers with an interest in forensic toxicology or related fields. We thank all authors for submitting their interesting contributions for this special issue, the referees for their critical but constructive comments, and the Editorial Office and the Editors for their friendly cooperation.

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