1 Background

Drugs of abuse and their preparations are psychotropic substances, that can cause consciousness and perception-altering effects in the central nervous system. In particular, habitual high-dose consumption of such drugs can damage the body, cause sequelae and lower life expectancy [1]. Several drugs can induce psychological or neurological dependence diseases under particular conditions. Depending on the neurological mode of action and the duration of administration, discontinuation or cancellation of certain drugs can lead to a mental or physical withdrawal syndrome [2]. Those affected are vulnerable to lose their social connections. Furthermore, dependency can potentially lead to procuring crime [3]. Drugs of abuse are classified into substance groups with similar chemical structures or the same mechanism of action. As part of an addiction therapy, of criminal proceedings or in context of occupational medicine, it is important to identify a drug abuse or to monitor the use of a substitution drug. Depending on the medical background, the search can be focused on a single active ingredient or on several groups of drugs.

2 Methods

The reagents, analytical column and mobile phases of the LC-MS/MS kit were provided by Chromsystems GmbH. Sample preparation was performed according to manufacturer’s instructions: 50 µl urine was mixed with an internal standard solution. An enzymatic hydrolysis was carried out for 2 hours and a precipitation reagent was added. After centrifugation, 100 µl supernatant was diluted with 100 µl dilution buffer and injected into the chromatographic system. The total run time of the analysis was 15 min using a Sciex QTRAP 5500 instrument (Darmstadt, Germany) combined with an Agilent 1260 HPLC system (Walldorff, Germany).

3 Results

The evaluation of the assay was based on the GTFCh guideline for quality assurance [5]. Further, this LC-MS/MS assay was compared with established assays (GC-MS and LC-MS/MS). Comparison of sample preparation in daily routine with established in-house GC-MS methods: The LC-MS/MS assay is based on a single sample preparation (see above), which takes about 2 hours per day (incubation time excluded). Regarding GC-MS, various optimized sample workups depending on the substance class are required. In all cases a hydrolysis step is necessary. Nevertheless, the GC-MS sample preparations, including additional extraction and derivatization steps, are considerably more extensive.

4 Conclusions

The presented LC-MS/MS assay is suitable and reliable for the determination of the substances included in this study. The outcome of the LC-MS/MS assay is comparable with results of reference methods. Therefore, the new LC-MS/MS assay can be applied for confirmation analyses for drugs of abuse. Due to the less labour-intensive sample preparation and reduced sample volume, the assay also offers advantages for the daily laboratory routine. This could also be proved by the fact that new method has already been used as a standard method with a high number of samples for almost a year. In addition, the LC-MS/MS kit has been forensically accredited as a toxicological screening procedure at the Staber laboratory for driving aptitude diagnostics.

5 Literature


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