Enantiomeric determination of amphetamine, methamphetamine and MDMA in human urine by CE-MS/MS

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Gold statement
- Study of different chiral selectors by CE-MS/MS
- Differentiation between R and S amphetamine enantiomers
- Application to human urine

Introduction
Amphetamine-type substances (ATS) include the most popular drugs in the market such as amphetamine, methamphetamine and 3,4-methylenedioxymethamphetamine (MDMA or ecstasy) [1,2]. They are widely known as illegal drugs but they are also used for medical purposes. These drugs contain a chiral centre and thus, they have two enantiomers with different pharmacokinetic and neuro-pharmacological properties. For this, it is important to distinguish between the R and S enantiomers and provide selective and sensitive methods, where MS detectors play an important role [3].

Body
Different chiral selectors have been evaluated for the enantiomeric determination of ATS in human urine by using capillary electrophoresis coupled to tandem mass spectrometry (CE-MS/MS). Due to the use of an MS detector, it is important a proper study of the BGE since the presence of non-volatile compounds such as chiral selectors in the MS ionization source may produce ion suppression, and this can have negative effect on the sensitivity. The method is based on an off-line solid phase extraction (SPE) using a weak cationic mixed-mode cartridge (Oasis WCX) and the analysis by CE-MS/MS. The main advantage of this instrumentation is that it allows an easier enantiomeric separation compared to liquid or gas chromatography, which needs the use of chiral columns or derivatization processes. To achieve the best enantiomeric separation, different chiral selectors were evaluated, which were tested individually or combined in different proportions: sulphated α-cyclodextrin, sulphated β-cyclodextrin, sulphated γ-cyclodextrin, phosphated γ-cyclodextrin, sulfobutylated β-cyclodextrin and vancomycin.

Conclusion
The use of chiral selectors in enantiomeric CE separations has overcome the limitations of other techniques that needed expensive chiral columns or elaborated treatments. In this work, we have demonstrated that coupling the CE with MS/MS detection with a previous sample pretreatment by SPE, allowed the ATS enantiodetermination in urine at low levels of concentration.

References
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