B87 The Application of Capillary Electrophoresis for Enantiomeric Separation of N,N-Dimethylamphetamine and its Related Analogs: Intelligence Study on Routine N,N-dimethylamphetamine Seizures

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This goal of this presentation is to demonstrate the use of capillary electrophoresis (CE) for chiral separation of the seized N,N-dimethylamphetamine (DMA) samples with aim of obtaining important information for intelligence study.

This presentation will impact the forensic community and/or humanity by illustrating the significance of chiral separation of seized drugs in forensic scince so that valuable information such as intrinsic characteristics of the seized samples and clues for predicting possible synthetic methodologies can thus be obtained.

Methamphetamine (MA), a powerful stimulant of the central nervous system, is one of the most popular abused drugs in Hong Kong. DMA, the *N*-methylated analogue of the MA, is well known of producing behavioral effects that are generally comparable to those of MA but with reduced potency. Cases related to DMA have increased in Hong Kong in the past few years. It may be due to the fact that crystalline forms of DMA and MA ('ICE') share similar physical appearance. Thus, DMA can be sold to abusers as MA. Most of the seized DMA samples are crystalline solids that are either in the pure form or mixed with MA. Apart from crystalline solid samples, some samples are tablets. Like 'ecstasy', these tablets are of different color, marking and usually mixed with a number of dangerous drugs such as 3,4-methylenedioxymethamphetamine (MDMA), 4-methylenedioxymethamphetamine (MDA), MA, and ketamine.

The recent increase in the abuse of DMA in Hong Kong is of great concern to law enforcement departments. However, only a few studies on DMA have been reported in the literature compared to its analogue, MA. Therefore, a detailed study on DMA is important for deriving valuable information for drug intelligence purpose. Both MA and DMA have a chiral carbon centre at the α-position, which is known to affect their potency. For example, *d*-MA and *d*-DMA are known to have stronger stimulatory effect than their corresponding counterparts, *l*-MA and *l*-DMA. By measuring the enantiomeric excesses of the seized samples, intrinsic characteristics of these samples can be obtained. In addition to this, the enantiomeric purities of the seized drugs can provide clues for predicting possible synthetic methodologies. Identification of racemic DMA or MA indicates that these samples are derived from reductive amination of an achiral precursor phenylpropan-2-one (P2P). On the other hand, optically pure DMA or MA may have come from stereospecific reduction of the enantiopure β-hydroxyphenethylamines (i.e., ephedrine, pseudoephedrine, methylephedrine, and methylpseudoephedrine.)

A number of analytical methods have been employed for the separation of chiral compounds. Both GC and HPLC are commonly used methods, however, they do have some limitations. Usually GC analysis requires tedious derivatization with chiral reagents and HPLC analysis involves the use of expensive chiral columns/mobile phase. In contrast, capillary electrophoresis is relatively simple, of low cost and has very high separation efficiency. In fact, previous study in the laboratory has successfully demonstrated the use of CE for enantiomeric separation of *dl*-MA and its related compounds (i.e., *dl*-ephedrine and *dl*-pseudoephedrine). In this study, an optimized CE method for simultaneous chiral separation of *dl*DMA, *dl*-MA *dl*-ephedrine, *dl*-pseudoephedrine and *dl*-methylephedrine is reported. The method has been subsequently applied to analyze seized DMA samples in Hong Kong. Results show that all the seized DMA samples are predominantly the *d*-form (>87% ee). The MA samples are of various enantiomeric forms, but none of them is racemic. These results indicate that the seized samples are unlikely to be synthesized from P2P. It seems to be more likely that MA and DMA were obtained by way of reduction of ephedrine/pseudoephedrine and methylephedrine/methylpseudoephedrine respectively

N,N-Dimethylamphetamine, Capillary Electrophoresis, Intelligence Study

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