K19 Multi-Analytical Measurement of Drugs of Abuse in Vitreous Humor With Evidence Biochip Arrays

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After attending this presentation, attendees will be able to see the application of biochip technology to the screening of common drugs of abuse compounds in small amounts of vitreous humor.

This presentation will impact the forensic science community by introducing cutting-edge technology for screening very small quantities of vitreous humor for drugs of abuse. This is pertinent in cases where no blood or urine is available and for screening for drugs in small children.

I**ntroduction**: To accommodate the demand for tests and the appearance of new drug classes, new analytical methods are required for clinical, regulatory, toxicological, and forensic applications. The use of screening methods enabling the rapid and simultaneous detection of multiple drugs of abuse facilitates the application to regulatory control as only positive results require confirmation. Evidence biochip array technology provides a flexible platform for the simultaneous determination of multiple analytes from a single sample across a number of matrices including vitreous humor.

Methods: The Drugs of Abuse I blood array was used to analyze the vitreous humor from 81 subjects that had gone through postmortem examination in the NHS Grampian region and the results compared against confirmatory GC/MS and LCMS/MS methods. The Drugs of Abuse I blood array facilitates the simultaneous detection of the following drug classes using 20µL of vitreous humor – methamphetamine, amphetamine, barbiturates, generic benzodiazepines, lorazepam, methadone, PCP, opiates, cocaine metabolite, and THC. Cut-off's were chosen by evaluation of a set of standards manufactured by spiking across a calibration range (5-200ng/mL) of the drug/metabolite of interest into bovine vitreous humor.

Results: The biochip screening method showed a high degree of agreement with the confirmatory methods with an overall average of 92% of results being in concordance with those generated from confirmation. Of the various drug classes: six agreed with confirmation in over 96% of cases (amphetamine, barbiturates, benzodiazepines, cocaine metabolite, methadone, and PCP); two others agreed with confirmation in over 90% of cases (lorazepam and methamphetamine). The opiates test was correct in 82% of the cases with THC correct in 67% of the cases. The lower specificity of the THC detection in vitreous may be on account of the proportion of THC and THCCOOH distributed in the vitreous humor compared to blood. Discrepant results were both falsely negative and falsely positive in relation to the chosen cut-offs for these two drug classes.

Conclusion: The data from this small pilot study indicate that the biochip drugs of abuse blood arrays can potentially be modified to allow for the drugs screening of vitreous humor. This is potentially very useful in cases where postmortem blood and/or urine may not be available, for example in victims of traumatic injury. Further investigations may improve the agreement for opiates and THC either by a different choice of cut-off concentration or possibly by performing a quick sample extraction procedure. This technology enables the generation of quantitative abused drug profiles and represents a useful tool for application in forensic and postmortem toxicological settings.

Biochip Array, Vitreous Humor, Drugs of Abuse

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