K17 An Application of Speciated Isotope Dilution Mass Spectrometry (SIDMS) for Simultaneous Drug Quantitation of Gamma-Hydroxybutyric Acid (GHB) and Gamma-Butyrolactone (GBL) in Urine and Blood Matrices

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After attending this presentation, attendees will learn how Speciated Isotope Dilution Mass Spectrometry (SIDMS) can be applied to the forensic community. This presentation will provide an example of GHB and GBL to show how this method can be applied.

This presentation will impact the forensic science community by showing the community a quicker and more accurate way to quantitate drugs with the example of GHB and GBL.

There are currently two major problems in the forensic science community: scrutiny of analytical methods and a rapidly growing backlog of samples. An accurate, rapid and simultaneous measurement of GHB and GBL in urine and blood was developed to combat these issues. This legally defensible method for analyzing both *gamma*- hydroxybutyric acid (GHB) and *gamma*-butyrolactone (GBL) simultaneously uses speciated isotope dilution mass spectrometry (SIDMS). Current methods use gas chromatography mass spectrometry (GC/MS) and are not able to quantitate both GHB and GBL simultaneously; therefore, multiple extractions are required in order to quantitatively analyze GHB and GBL. To perform SIDMS, deuterium labeled GHB and carbon labeled GBL were utilized to spike the samples for quantitation. Once the naturally occurring analyte is spiked with the isotopically enriched analyte, SIDMS can account for any inter-conversion that occurs between GHB and GBL during sample preparation or analysis. After spiking the samples, a mixed-mode (phenyl and propyl sulfonic acid) solid phase extraction column was used for the filtration extraction of GHB and GBL from urine and blood samples. Mass spectrometry studies were done using electrospray ionization. Method validation was completed with triplicate sample preparation and analyses (n =9) with a known concentration of GHB and GBL in standardized urine and blood. Significant values of GHB and GBL were chosen based on previous studies completed in the literature. Concentration values of 5 ppm, 10 ppm, 200 ppm, and 400 ppm were used. Endogenous levels of GHB average below 10 ppm. Some studies have reported endogenous cutoff levels of GHB should be 6 ppm in urine to avoid false negatives. GHB overdoses were reported at an average of 200 ppm and have been seen as high as 400 ppm. The experimental values and the standard values were in agreement with the 95% confidence interval. By using SIDMS, inter-conversions between GHB and GBL can be accounted for and the correct quantification of both analytes can be made. Temperature and pH levels were varied to stimulate conversion between the two analytes, GHB and GBL. The inter-conversion was accounted for in the SIDMS calculation, which demonstrates the benefit for the use of this method in the forensic science community. Calculations were made to account for the inter-conversion, which demonstrate the use of the SIDMS method for drug quantitation.

This method can help forensic scientists by providing a procedure that is legally defensible and quicker than other traditional methods of analyzing GHB and GBL. This method can be beneficial to the forensic science community.

Quantitation, SIDMS, GHB

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