

Department of Clinical Laboratory Sciences

Graduate Masters Theses

Gamma-Hydroxybutyric Acid Evaluation of Current Analytical Methodologies and Determination of Endogenous Postmortem Concentrations in Biological Fluids. Tiffany Flowers, MS. May 2003.

ABSTRACT

An important issue in the interpretation of the presence and pharmacologic significance of Gamma-hydroxybutyric acid (GHB) is to first differentiate antemortem GHB consumption from postmortem GHB production. One hundred postmortem blood and urine specimens were collected at autopsy from decedents whose medical and presenting history were not suggestive of GHB administration. Three analytical methods were evaluated and compared to determine the optimal method for the identification and quantitation of GHB. Each method was evaluated over the same concentration range by analyzing the same set of GHB calibrators and establishing a least squares linear regression curve for each analytical method. The factors evaluated for the determination of the “best” method include assay simplicity, assay reproducibility, assay cost and the lowest limit of quantitation (LOQ) and limit of detection (LOD), calculated within the fixed concentration range established by the set calibrator concentrations tested by each method. The one-step liquid-liquid di-trimethylsilyl (di-TMS) derivatization and extraction procedure proved to be the simplest and most robust method and exhibited a linear range from 1mg/L with a limit of detection (LOD) of 1mg/L to 5mg/L based on a least squared linear regression curve. Once the di-TMS derivatization method had been determined to be the best of the 3 methods evaluated, the endogenous GHB concentrations expected to be present in the postmortem urine and blood samples were measured using this method. The blood GHB concentrations that were measured ranged from less than the LOQ (<5.0 mg/L) to 35.7 mg/L, and the urine concentrations ranged from less than the LOQ (<5.0 mg/L) to 26.8 mg/L. The postmortem GHB concentrations determined in this sample population of 100 decedents will facilitate the interpretation of GHB concentrations in postmortem cases by forensic toxicologists and medical examiners, especially when the question of whether the presence of GHB identified can be accounted for as either differentiation of illicit antemortem GHB consumption as compared to the natural process of postmortem or endogenous formation of the GABA metabolite. Such interpretive ability is especially useful and important in cases of erratic driving, drug facilitated sexual assault, and in the more rare instances of GHB related deaths.