



### K48 Three Gamma Hydroxybutyrate Related Deaths

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The goal of the presentation is to identify and describe the characteristics of three, HCMEO Gamma Hydroxybutyrate (GHB) - related deaths occurring within the period of 2000-2005.

This presentation will impact the forensic community and/or humanity by demonstrating how the interpretation of postmortem GHB can be a challenge to determine its significance in the cause and manner of death.

Gamma-Hydroxybutyric acid had been used clinically, beginning in the early 1960s, as an anesthetic and hypnotic agent. It is now classified as a Schedule I drug in the United States and has no currently approved medical use. This reclassification was made in 2000 as a result of its abuse as an alternative to anabolic steroids by body builders, and by others, for its central nervous system depressant effects: drowsiness, dizziness, visual disturbances, amnesia and loss of consciousness. GHB has become a popular drug of abuse in association with sexual assaults. Researchers have reviewed twenty-three Harris County Medical Examiner's Office (HCMEO) cases, from the five-year period between 2000 and 2005, in which GHB was detected. GHB was determined to be the cause of death in three of these cases.

Interpretation of postmortem GHB is a formidable challenge. GHB occurs endogenously in most mammalian tissues, as a product of postmortem degradation, or as a metabolic product of the inhibitory neurotransmitter, gamma-aminobutyric acid. It is generally not detected at significant concentrations in blood or urine from living persons and postmortem production can be reduced through use of preservatives. Peak plasma concentrations can occur within 20-40 minutes and peak urine concentrations occur within 4 hours of drug use. The half-life in blood is less than one hour and its duration of action are three to four hours. Less than 5% of a dose is eliminated unchanged in urine and it is generally undetected by twelve hours after administration. GHB may also be administered in the form of Gamma-Butyrolactone, (GBL) and this substance may be observed in urine, as evidence of the dosage form or as a product of spontaneous cyclization.

The three GHB-related cases from the Harris County Medical Examiner's Office are described in Table 1.

**Table 1: Three Harris County Medical Examiner GHB Cases**

<b>Case Facts: Age/Race/Gender</b>	Case 1 17 yrs. White Male	Case 2 25 yrs. White Male	Case 3 34 yrs. White Male
<b>History of Illegal Drug Use</b>	No	Cocaine & Ecstasy	Cocaine & GHB
<b>Toxicology Results:</b>			
<b>Urine GHB</b>	108 mg/L	328 mg/L	701 mg/L
<b>Urine GBL</b>	80 mg/L	5798 mg/L	761 mg/L
<b>Urine GBL</b>	<10 mg/L	50 mg/L	28 mg/L

The circumstances surrounding these three deaths were similar. In each case, the decedents had been partying with friends. Two of the decedents were later found dead at their residences and one was found at a friend's house. The time elapsed from last seen alive ranged from 5 to 12 hours. Case number 1, a seventeen-year-old male, had a history of depression and attention deficit disorder. Fluoxetine and diazepam were detected in the blood of this individual and were included in the cause of death. Alcohol or other drugs were not detected in any of these cases.

External or internal signs of trauma were not observed at autopsy. Congestion of organs was noted in all three cases and two had evidence of pulmonary edema.

GHB was detected and quantified in blood and urine by gas chromatography / mass spectrometry of liquid-liquid extracts after acid catalyzed cyclization to GBL. GBL, in urine, was determined by GC/MS, by extraction prior to acid treatment.

The cause of death in Case 1 was assigned as combined toxic effects of GHB, benzodiazepines, and fluoxetine. In cases 2 and 3, the cause of death was acute GHB toxicity. In all three cases the manner of death was accident.

#### **Gamma-Hydroxybutyrate (GHB), Gamma-Butyrolactone, Cause & Manner of Death**