G34 Unexplained Sudden Death and the Likelihood of Drug Abuse

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After attending this presentation, attendees will be able to define the relationship between drug abuse and deaths where neither anatomical nor toxicological cause for death is found.

This presentation will impact the forensic community and/or humanity by recognizing that a history of drug abuse may be sufficient to explain death in appropriate circumstances, just as chronic alcoholism can be accepted as a cause of death even in the absence of acute ethanol intoxication.

Rationale: Our office regularly receives cases of young adults with a history of drug abuse who have died suddenly and unexpectedly in whom neither anatomical nor toxicological cause for death is found at autopsy. In forensic pathology, these deaths are likely to be classified as undetermined in cause and manner. The common presence of a history of drug abuse, however, has led us to hypothesize that drug abuse induces some change that increases the risk of sudden death and that this change persists after the drug is no longer detectable in the body.

Methods: We conducted a retrospective case-control study of deaths investigated by the Jefferson County Coroner/Medical Examiner Office, Alabama between 1986 and 2002. The study group consisted of decedents between 10 and 70 years of age whose cause and manner of death remained undetermined following an autopsy and toxicological analysis for ethanol and drugs of abuse. The control group was chosen to most closely represent a random sampling of the population of Jefferson County, Alabama. The decedents chosen for the control group were either pedestrians or passengers in motor vehicle accidents, people who died suddenly and unexpectedly while engaged in ordinary pursuits. Every decedent in the control group received an autopsy and toxicology analysis for ethanol and drugs of abuse. The control group was age matched to the study population within 5 years of the age of the study decedent and within 2 calendar years of the date of death of the study decedent (to keep social trends similar). The charts of all cases and controls were reviewed for the circumstances surrounding death, a documented history of drug abuse, and any compelling physical signs at autopsy that indicated drug use, i.e. needle track marks, nasal septum perforation, or polarizing particles in foreign body giant cells within the lungs. All toxicology results were noted including the presence of cocaine, any other drugs or medications, and ethanol. Decomposed remains were included in the study.

Results: The study group of undetermined deaths consisted of 62 decedents, 24 of whom had some evidence of drug abuse (history, physical signs, positive toxicology for cocaine or its metabolites in urine or bile, opiates, or methamphetamine). In the matched control population 9 decedents had a positive drug history or a drug of abuse detected by toxicology or both. These results are shown below.

	Evidence of drug	**No evidence of drug abuse**	**Total**
Case study group (undetermined cause)	24	38	62
Control group (pedestrian or wreck)	9	53	62
Total	33	91	124

Analysis of these data shows that a decedent with a history of drug abuse has a risk odds ratio of 3.7 (95% confidence interval 1.59 8.69). In other words, an individual with an undetermined cause and manner of death is 3.7 times more likely to have evidence of drug abuse as is an individual who dies in a motor vehicle collision as either a pedestrian or passenger. For this study $p = 0.0015$, so chance is an unlikely explanation for these results. Nor is simple intoxication alone the explanation for death in the study group. Analysis revealed no statistically significant difference between the study group and the control group for the presence or absence of ethanol in the blood at the time of death.

Conclusion: A history of drug abuse is far more common in sudden, unexplained deaths than it is in a control group chosen to represent a random sample of the population, even in the absence of a level of drug sufficient to account for death at the time of death. Research suggests that cocaine use in particular induces chronic biochemical and physiological changes that persist beyond the presence of circulating cocaine in the blood, just as the induction of hepatic enzymes by alcohol persists beyond the presence of ethanol in the blood. These findings imply that a history of drug abuse may be sufficient to explain death in appropriate

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Sudden Death, Drug Abuse, Cocaine

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