## K39 Methadone Concentrations and Concurrent Drug Findings in Three Populations; Methadone Treatment Patients, Impaired Drivers, and Death Investigation Cases

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In this presentations, authors will compare methadone concentrations and concurrent drugs in three populations, to assist in interpretation of data.

Forensic Toxicologists are often asked to interpret levels of drugs in drivers and death investigations. Questions arise as to the significance, when the subject is in a methadone treatment program. In evaluating this data, it is helpful to know levels detected in treatment patients and the typical co-ingested drugs. Tolerance and drug-drug interactions can greatly influence the role of methadone in death or impairment.

Methadone is an important analgesic drug and also has a significant role in replacement therapy for individuals stopping opiate abuse. The significant narcotic analgesic effects of the drug, its frequent combined use with other CNS depressants, and the significant tolerance that can develop in long term users make methadone concentrations difficult to interpret. We evaluated methadone concentrations in three populations; individuals enrolled in a methadone treatment program who received daily controlled doses of methadone, individuals arrested for impaired driving who subsequently tested positive for methadone, and in deceased individuals who tested positive for methadone in postmortem toxicology screening. The treatment population was an urban population of 76 patients (50% male). Methadone doses ranged from 9mg to 250mg/day (mean 94mg, median 100mg) and were invariably administered as syrup. Samples were collected during a periodic medical evaluation, and were collected within 0-3.5 hours of administration of the daily dose. Methadone concentrations in this population ranged from 0.013 to 0.85mg/L (mean 0.29mg/L, median 0.29mg/L). These samples were collected anonymously and there was no information available regarding their medical examination. All patients however were ambulatory and many had driven to their appointments at the clinic. The second group studied were individuals whose driving or behavior had resulted in them being arrested, suspected of drug impaired driving. Over an 18 month period, 67 cases tested positive for methadone. The population was 73% male with a median age of 43. The average concentration of methadone in this group was 0.24mg/L (median 0.19mg/L), with a range of 0.015 to 0.83mg/L. Driver behaviors in this group included CNS depression, confusion, disorientation, incoordination, and physiological parameters consistent with intoxication from narcotic analgesics. We were not able to assess any relationship between drug concentrations and degree of effect. Finally, over the same 18month period, methadone was detected in autopsy samples from 224 deceased individuals (70% male, median age 43). Deaths were attributed to a variety of causes, not all drug related. The average methadone concentration was 0.48mg/L (median 0.26mg/L) within a range 0.05 to 7.4mg/L. We will present several case studies in the impaired driving and death investigation groups. It was concluded that the range of concentrations in ambulatory populations exceeded that previously reported for the normal therapeutic range (0.35 – 0.56mg/L), and that deaths were often attributed to methadone intoxication in the absence of other obvious causes at concentrations within the range frequently encountered in these other ambulatory populations. Consideration of the presence and concentrations of other co administered drugs, the individual's enrollment in a supervised methadone program, and the length of time they had been taking the drug are important factors in being able to assess the significance of methadone in death investigations.

**Methadone, Impaired Drivers, Death Investigation**

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