



### A8 Unique Evidence and Examination in Methadone Suspected Death

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After attending this presentation, attendees will have an idea of the types of evidence examined and analytical approaches employed in solving cases at the United States FDA's Forensic Chemistry Center (FCC).

This presentation will impact the forensic science community due to the evidence received for evaluation and the approaches used to obtain results, in particular, direct analysis in real time with mass spectrometric detection (DART-MS).

The FDA's Forensic Chemistry Center (FCC) encounters many different types of cases involving foods, drugs, and medical devices. Many articles discuss methadone fatalities involving children and associated toxicology results. This case review is unique due to the evidence received for evaluation and the approaches used to obtain

results, in particular, direct analysis in real time with mass spectrometric detection (DART-MS).

The FCC received a case involving the death of a 17-month-old child. It was suspected the child had received a fatal dose of methadone. The evidence sent to the laboratory included the t-shirt the child was wearing at the time of death, various liquids possibly ingested by the child, two bottle nipples with attached bottle rings, a bottle of over-the-counter children's oral suspension pharmaceutical product containing a semi-solid, and an oral syringe.

The child's t-shirt had visible areas of discoloration, and was analyzed for areas of fluorescence using a multiple wavelength light source. The fluorescent spots of interest as well as other areas on the t-shirt, were subsequently analyzed for controlled substances and pharmaceuticals. Fourier Transform infrared spectroscopy (FT-IR), DART-MS, gas chromatography with mass spectrometric detection (GC-MS), and liquid chromatography with mass spectrometric detection (LC-MS) were employed in the analyses. Methadone and cocaine were identified on the front collar of the t-shirt. The lower front of the t-shirt, as well as the back collar, shirt tail, and middle back of the t-shirt were also consistent with the presence of cocaine.

The liquids and semi-solid were extracted with solvents, and the resulting solutions screened for the presence of methadone, other pharmaceuticals and poisons using GC-MS. The inside and outside surfaces of the ring-nipple units were rinsed with methanol, and the resulting solution screened for the above substances using GC-MS. The tip and inside of the oral syringe barrel were also rinsed with methanol and analyzed using GC-MS. These same items were analyzed by LC-MS to obtain improved sensitivity. No methadone, drugs, poisons, or other pharmaceuticals were detected in the extractions of the liquids. Methadone was identified in the semi-solid from the bottle of over-the-counter children's oral suspension, and quantitated at 4 µg/g of semi-solid. Acetaminophen, chlorpheniramine, and methorphan were also identified in the semi-solid. These three components were listed as ingredients on the bottle. Methadone was also identified in the rinse solutions of the ring-nipple units and oral syringe. Methadone was quantitated at 0.2 µg in one ring-nipple unit extraction, 18 µg in the extraction of the second ring-nipple unit, and at 600 µg in the syringe extraction. Acetaminophen, chlorpheniramine, and methorphan were also identified in the extraction from the syringe.

The investigators, with results in hand, encouraged the mother of the child to tell the story of what led to her child's death. Her son had been born with a drug dependency and was treated for withdrawals by a physician. However, the mother suspected the child was still having withdrawals. So on the advice of a "friend," the mother continued to give the child methadone for a year without a doctor's supervision. She found her toddler unresponsive in his crib. The mother pled guilty to a Class A felony neglect of a dependent. She was sentenced to 20 years in prison to be followed by ten years of probation.

#### **Methadone, Death, Toddler**