



### **K73 Fatal Methadone Intoxication in an Infant Listed as a Homicide**

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After attending this presentation, attendees will better understand fatal and non-fatal accidental methadone overdoses in the children of drug-dependent parents as well as infrequent cases of fatal methadone intoxications in children due to deliberate drug administration by adults seeking to sedate and calm them. A review of the literature on this topic is also provided.

This presentation will impact the forensic science community by highlighting the importance of considering all potentially relevant toxicological data in order to formulate appropriate hypotheses concerning the cause and manner of death. In addition, this presentation will impact the forensic science community by emphasizing the usefulness of hair analysis to identify threatening situations for the children of drug-dependent parents and possibly support measures by the authorities to recognize and intervene in these potentially fatal situations.

Methadone is a synthetic, long-lasting opioid whose structure has no relation to morphine or other opium alkaloids. It is a long-acting  $\mu$ -receptor agonist with pharmacologic properties qualitatively similar to those of morphine; however, it is characterized by a longer half-life elimination and improved oral bioavailability. The drug has a long, successful history of moderate-to-severe pain relief in opiate-dependence substitution treatment. Recreationally, it is used for its sedative and analgesic effects.<sup>1</sup>

Fatal and non-fatal accidental methadone overdoses in the children of drug-dependent parents have been previously reported by numerous authors. In most of these cases, intoxication is an unfortunate consequence of methadone availability at home, when one of the parents or relatives are on a methadone maintenance program, and may be related to inappropriate methadone storage or the liquid preparations resemblance to common soft drinks. Voluntary administration with the purpose of calming or sedating a child that eventually results in the infant's death is extremely infrequent, though it has occurred.<sup>1-7</sup>

In this presentation, an autopsy case pertaining to a 32-month-old infant who was repeatedly exposed to methadone by his parents will be described. Autopsy revealed a coarctation of the aorta with a focal stenosis located at the junction of the distal aortic arch and the descending aorta. Left ventricular hypertrophy was also observed. Both of these findings were considered to have not played a role in the child's death. Methadone was detected in the femoral blood (0.633mg/l), urine (5.25mg/l), bile (2.64mg/l), and gastric contents (1.08mg). A segmental hair analysis was performed by Gas Chromatography/Mass Spectrometry (GC/MS) and showed the presence of methadone in both the proximal (3.11ng/mg) and distal (4.91ng/mg) portion of the hair. Methadone was also detected in nail samples. A segmental hair analysis (performed on the younger brother of the deceased) revealed the presence of methadone in both the proximal (0.40ng/mg) and distal (0.93ng/mg) segments, as well as the presence of 6-monoacetylmorphine exclusively in the distal portion.

In this case, it was concluded that the deceased child had deliberately received repeated methadone administered by one (or both) of the parents, most likely in order to induce sedation. The cause of death was determined to be methadone intoxication and the manner of death was listed as homicide. Hair testing revealed continual methadone exposure in both the deceased and his younger brother. Hair analysis also demonstrated that the latter was exposed to heroin.



## Toxicology Section - 2016

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### Methadone, Overdose, Infant