K66 Determination of Guanfacine (Tenex) in a Case of Munchhausen by Proxy

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The goal of this presentation is to present a methodology for the determination of Guanfacine (Tenex) and to alert the forensic community that the drug may be used and found in cases of Munchhausen by Proxy.

This presentation will impact the forensic science community by demonstrating the possible treatment of children diagnosed with attention deficit hyperactivity disorder (ADHD) with guanfacine demonstrates the need for a reliable method to detect the drug in cases where Munchhausen by Proxy could be a source of toxicity or unsuspected death.

Guanfacine is a derivative of the nucleic acid guanidine, and is used to treat high blood pressure. Only one published method is available for the quantitation of guanfacine, but the method does not provide for positive qualitative identification. Recently, guanfacine alone or in combination with clonidine has been indicated as a possible treatment for children diagnosed with attention deficit hyperactivity disorder (ADHD).

A four-year-old male child was transferred to an academic tertiary care center for evaluation of a 3-day history of intermittent hyper-somnolence. The child had similar episodes in the past, involving prior hospitalization in the community, an extensive neurological work-up, and follow up with a pediatric neurologist for one year. The child was being treated with valproic acid for possible absence seizures (not seen on prior EEG), and clonidine for sleep. Neurological as well as clinical laboratory testing were all normal, with the exception of a mildly elevated ammonia concentration was resolved without intervention. No drugs were detected on an initial comprehensive drug screen. The child remained hyper-somnolence with intermittent bradycardia without hypotension, while additional neurological studies were negative. Review of the nursing notes revealed that the bradycardic episodes coincided with the somnolent episodes. The child was placed on a three day continuous EEG and camera monitoring. A thorough review of the family history revealed that a sibling was being prescribed guanfacine. Therefore, urine obtained upon admission as well as five other urine specimens were analyzed for guanfacine.

Due to the lack of available mass spectral data, the identification of guanfacine was determined from elicitation of fragmentation ions and pattern. Using a modification of our meperidine/normeperidine urine method, guanfacine was identified and semi-quantified in urine by GC/MS. The pH of 1 ml aliquots of urine calibrators and specimens was adjusted with 0.5 ml of saturated carbonate:bicarbonate solution and extracted using n-butyl chloride with rotate mixing for two minutes, then centrifuged. The upper n-butyl chloride was transferred to a clean test tube, and the guanfacine and the internal standard were derivatized using 50 mL of heptaflurobutyric anhydride (HFBA) at 75 °C for a minimum of 30 minutes. The n-butyl chloride:HFBA solution was evaporated under nitrogen and reconstituted with ethyl acetate and injected into the GC/MS. Guanfacine was analyzed on a Shimadzu QP-2010 GC/MS system operated in SIM mode, with a DB-5 column (30m x 0.25 mm x 0.33 mm) and a 5 m guard column. The GC oven temperature was programmed from 160 °C, 0.1 min hold, to 280 °C at 20 °C/min. The ions monitored for guanfacine and protriptyline (internal standard) were: *m/z* 86, 272, 274, 159, 161 and 191, 189, respectively. The urine guanfacine concentrations upon initial admission 2, 5, 7 (am), 7 (pm), and 11 days post admission were 3.8, 6.4, 17.9, 3.3, 1.6 mg/L and None Detected, respectively.

The fluctuations in the child's urine guanfacine concentrations correlated with the symptomatic and asymptomatic episodes the child experienced. Upon follow up police interrogation and video, the mother elicited a complete confession. The child dramatically improved, and was eventually discharged.

Guanfacine, GC/MS, Munchhausen by Proxy

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