K25 The Stability of Drug Analytes in Positive Umbilical Cord Tissue After Long-Term Frozen Storage

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Learning Overview: After attending this presentation, attendees will be able to evaluate the stability of 33 drug analytes in positive human umbilical cord samples after –20°C sample storage for approximately one year.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by suggesting the proper specimen transportation and storage conditions for human umbilical cord tissue required to improve patient outcomes.

Hypothesis: Drugs of abuse remain detectable in umbilical cord tissue after one year of storage at –20°C.

Drug abuse during pregnancy has risen rapidly, with the increase of opioid abuse over the past decade, boosting both the number of expectant mothers on opiate maintenance therapy and the incidence of Neonatal Abstinence Syndrome (NAS). As a result, evaluating *in utero* drug exposure during pregnancy is emerging as a critical service that hospitals should provide for both patient care teams and social services. Despite the long-time use of meconium in neonatal drug testing, many institutions are exploring alternative types of specimens, like umbilical cord tissue, because unlike meconium, umbilical cord tissue is available immediately after birth, is easy to collect under chain of custody, is available in sufficient quantity, and allows for a significant reduction in the turnaround time for results. However, the detection of drugs in umbilical cord tissue depends on many factors, including the extent of maternal drug use, the deposition of drug analytes in umbilical cord tissue, the analytical method, and, finally, the drug stability.

This research compared historical toxicology results with re-test confirmation results of the same umbilical cord tissue after frozen storage to evaluate stability of 33 drug analytes.

Sample preparation for drugs of abuse confirmation methods for cord tissue consisted of an external saline wash to remove contaminants followed by homogenization and extraction. The analytical method for cord tissue was performed on an AB SCIEX™ QTRAP 6500 triple quadrupole mass spectrometer equipped with an Electrospray Ionization source (ESI) for THCC and benzodiazepines and an AB SCIEX™ QTRAP 4500 triple quadrupole mass spectrometer equipped with an ESI for amphetamine, cocaine, and free opiates.

It was determined by the analysis of approximately 60 individual cord tissues that these 33 analytes remained stable in the cord tissue after -20°C sample storage for approximately one year. The 33 analytes confirmed were 6-monoacetylmorphine; 7-amino clonazepam; alprazolam; amphetamine; benzoylecgonine; buprenorphine; butalbital; clonazepam; cocaine; codeine; diazepam; delta-9-Tetrahydrocannabinol (delta-9-THC); delta-9-carboxy THC; dihydrocodeine hydrocodol; 2-Ethylidene-1, 5-Dimethyl-3, 3-Diphenylpyrrolidine (EDDP); fentanyl; hydrocodone; hydromorphone; meperidine; methadone, methamphetamine, morphine, norbuprenorphine, nordiazepam, norfentanyl, norhydrocodone, normeperidine, noroxycodone, o-desmethyltramadol; oxycodone; oxymorphone; tramadol; and zolpidem.

Drug Stability, Umbilical Cord, Forensic Toxicology

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