USDTL News

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Testing newborns for methamphetamine exposure still necessary

by Joseph Jones
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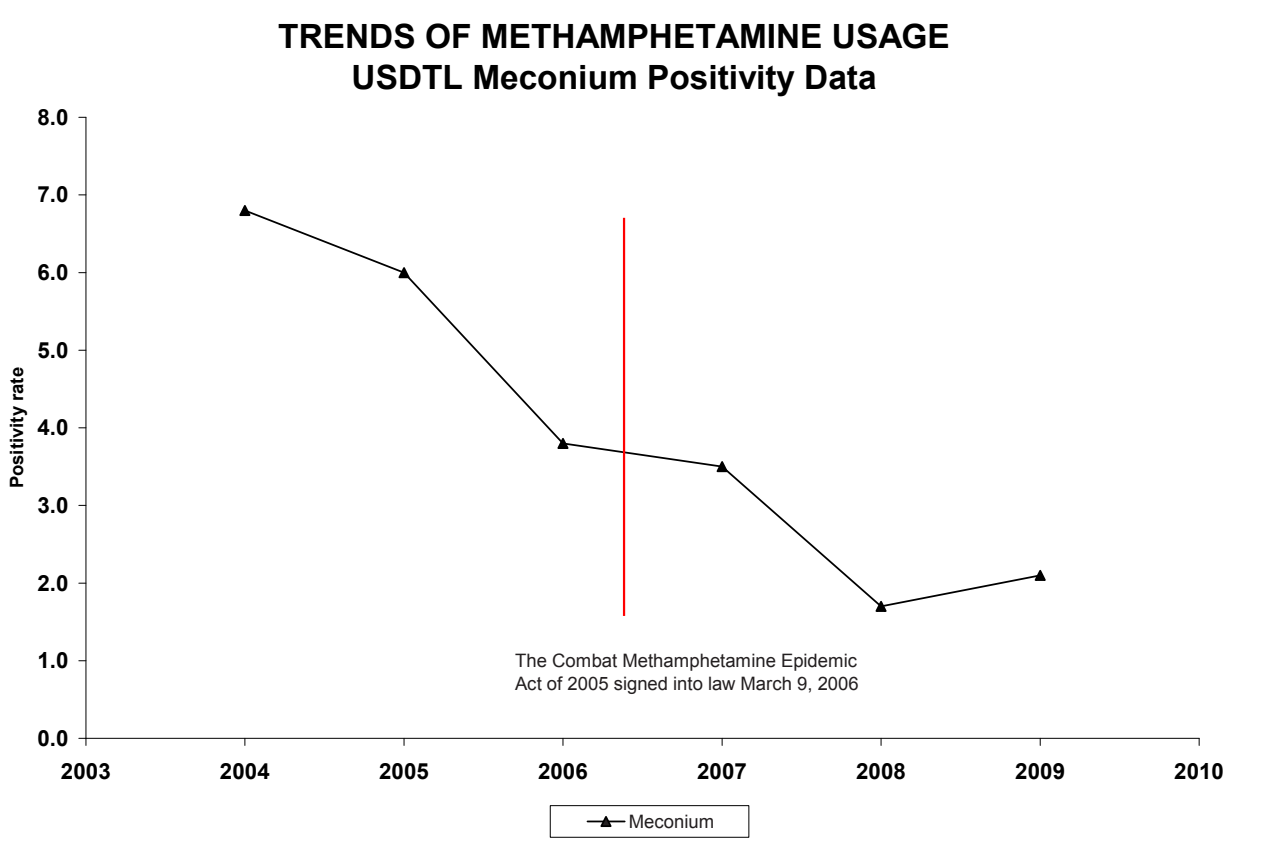
Immediately following passage of the Combat Methamphetamine Epidemic Act (CMEA) of 2005, methamphetamine (MAMP) positivity rates observed by a number of agencies, including United States Drug Testing Laboratories (USDTL) in meconium positivity, began to decline. USDTL rates indicate a slight uptick in MAMP positivity in 2009, showing that MAMP detection remains necessary and valuable.

MAMP abuse exploded on the American scene in the 1980s and increased in popularity until the CMEA was signed into law. Cold medications containing pseudoephedrine, which may be used as a starting material for the production of MAMP, were banned by the act as over-the-counter medicine. The CMEA limited the quantities for purchase, required photo identification and required personal information to be retained by the pharmacy for at least two years.

Newborns exposed to MAMP in the womb exhibit a number of negative attributes, such as small birth weight and distress. However, the long-term effects of neonates exposed to MAMP have not been well documented. The Infant Development, Environment, and Lifestyle (IDEAL) study, for which USDTL provided services, is recording those long-term effects as the study cohort is approaching 10 years of age. The IDEAL study was the first research project designed to identify MAMP-exposed children and follow them over an extended period of time.



Originally, it was assumed that the detection window for MAMP in meconium was limited to 20 weeks, like most other illicit drugs. However, the assumption that MAMP behaved similarly to cocaine, opiates and marijuana was incorrect. "A Brief Communication," authored by the IDEAL research group, observed the dissociation between maternal self-report of MAMP and the results of the meconium assay. The paper concluded, "meconium samples were more likely to test positive when maternal MAMP drug use continued into the third trimester and exceeded once per week."

The IDEAL study pointed out that the detection window is drastically shorter for MAMP, limited to the third trimester and requiring multiple doses per week. Improved positivity could be achieved by including a downstream metabolite, p-hydroxymethamphetamine, and utilizing expensive limit of detection chromatography by bypassing the immunoassay initial test. While p-hydroxymethamphetamine offers

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Choosing umbilical cord or meconium: what's the best fit?

by Charles A. Plate, Ph.D.
Laboratory Director

With several options for newborn drug tests now on the market, healthcare organizations must choose between seemingly similar tests to detect drug exposure during pregnancy. When deciding between the long-standing history with meconium and the new technology with umbilical cord, practitioners need to weigh their desired outcomes with each test's strengths.

United States Drug Testing Laboratories (USDTL) now offers two tests to determine if neonates have been exposed to drugs of abuse during pregnancy—MecStat℠ and CordStat℠.

Neonatal health practitioners concerned with speed and relative simplicity would benefit from CordStat℠. CordStat℠ involves a single sampling of 6-inch to 8-inch sections of umbilical cord tissue sent to USDTL for analysis. From the time the cord specimen is received in the laboratory, screen negative results will be reported out within 24 hours and screen positive results in two to three days. The nature of meconium passing itself makes collection difficult. Meconium testing involves multiple collections to obtain sufficient material to test. Multiple samplings from multiple babies extended over several days not only delay reported results, but can also raise chain-of-custody issues.

When concerned with alcohol exposure, MecStat℠ provides an appropriate solution.

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Umbilical cord testing uses 6 inches to 8 inches of umbilical cord tissue to determine newborn drug exposure. Umbilical cord has an equal or greater sensitivity for all drugs, except for cocaine.

Meconium can be tested both for drugs of abuse and fatty acid ethyl esters (FAEE), direct alcohol biomarkers. Through the support of a grant from the National Institute on Alcohol Abuse and Alcoholism, the USDTL New Applications Department is still researching the presence of a direct alcohol biomarker in umbilical cord tissue. The research is ongoing. MecStat℠ routinely identifies alcohol

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Cotinine assay tests for newborn exposure to nicotine

by Robert Demaree
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New studies show maternal smoking is associated with a number of complications during pregnancy and additional negative outcomes for the newborn. Infants born to smoking mothers are more likely to have low birth weight, be small for gestational age or experience a preterm birth. Cigarette smoking is a risk factor for both placental abruption and placenta previa. In a 2009 study, Yang et al. identified maternal smoking, alcohol consumption and availability of prenatal care as key factors associated with placental abruption. Low folic acid levels have been related to the incidence of neural tube defects, cleft lip, cleft palate and possible heart defects. Stark et al., in a 2007 article, reported that maternal smoking may restrict folate transport to the fetus. Low folic acid levels have recently been associated with attention-deficit and hyperactivity problems. Maternal smoking is related to a growing list of negative outcomes for the newborn.

16.4 percent of pregnant women smoked cigarettes during pregnancy.

The 2008 National Survey on Drug Use and Health (NSDUH) reported that 16.4 percent of pregnant women smoked cigarettes during pregnancy. NSDUH is an annual survey utilizing a face-to-face interview to collect data.

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Methamphetamine (cont.)

an interesting academic observation, it does not offer substantial benefit for routine screening purposes.

Immunoassay manufacturers over the past 30 years have been creating assays that are as specific as possible to MAMP. Broad, class-specific amphetamine immunoassays are generally undesirable for routine screening procedures, since the majority of specimens identified are caused by compounds not of interest, and are therefore needlessly costly. Using limit of detection chromatography is a very expensive alternative to the usual routine of immunoassay followed by chromatographic confirmation of presumptive positives. However, if requested, limit of detection chromatographic analysis (confirmation only) is available from USDTL. Experience has shown, though, that researchers and clients alike shy away from using limit of detection chromatography for their routine screening programs because of cost concerns.

USDTL offers an alternative for increased sensitivity for newborn exposure to MAMP during pregnancy. CordStat[SM], a newborn assay utilizing umbilical cord sections, has a higher MAMP positivity rate than other newborn assays. In the Phase I NIH/NIDA SBIR study with 118 matched pairs of umbilical cord and meconium, CordStat[SM] identified 11 percent more positives than did meconium. CordStat[SM] uses a universal specimen, is significantly easier than meconium to collect, has a faster turnaround time and improves chain-of-custody integrity. Visit www.usdtl.com or contact Client Services at (800) 235-2367 for more information.

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After the CMEA banned pseudoephedrine as an over-the-counter drug in 2005, positivity rates for MAMP decreased. However, 2009 saw a slight rise in positivity rates.

Nicotine (cont.)

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USDTL can now test newborns for cotinine, a nictotine metabolite, for maternal smoking during pregnancy.

Self-report may be unreliable in studies of smoking in pregnant women. Because of inaccuracies in self-reporting, a biochemical test method for nicotine is still needed. Once maternal smoking is recognized, the nurse or physician can properly treat the newborn.

United States Drug Testing Laboratories (USDTL) offers test methods for cotinine, the primary nicotine metabolite, in meconium, umbilical cord, hair, urine, oral fluid and blood spots. Our dried blood spot assay is the latest development from the USDTL New Applications Department. The laboratory can run the cotinine test with just five drops of blood from a newborn heel stick. These assays are available for both routine clinical testing and research projects. Contact Client Services at (800) 235-2367 for additional information.

Meconium or cord (cont.)

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Meconium and umbilical cord assays offer different advantages for newborn drug testing. Healthcare organizations must consider their desired outcomes when making their choice.

exposure during pregnancy.

The choice between MecStat[SM] and CordStat[SM] can also depend on which drugs of abuse the practitioner is trying to identify. MecStat[SM] still has a higher positivity rate for cocaine. USDTL is one of the few laboratories analyzing meconium samples for *meta*-hydroxybenzoylecgonine, a metabolite of cocaine. Testing for *meta*-hydroxybenzoylecgonine increases our positivity rates for cocaine compared to other meconium tests or umbilical cord, which does not have this metabolite. The majority of other laboratories do not test for this metabolite in meconium. If a practitioner holds a specific interest in exposure to cocaine, they would choose the USDTL MecStat[SM] test.

But, if we compare the cocaine positivity rate for CordStat[SM] to other laboratories' meconium assays that don't test for *meta*-hydroxybenzoylecgonine, they are comparable. CordStat[SM] is equally or more sensitive than MecStat[SM] for all other drug panels. So, if a practitioner has no specific concern with cocaine, they would likely choose CordStat[SM] because meconium is lost *in utero* in up to 20 percent of live births. Therefore, a practitioner can screen up to 20 percent more at-risk newborns by collecting umbilical cord samples. Also, sample volume can effect meconium sensitivity. Since drugs of abuse do not diffuse in meconium, with the exception of methamphetamine, if a section of meconium containing a drug is not collected, the drug will not be identified.

Whether practitioners value ease and reliability of collection or the option of an alcohol biomarker, USDTL offers a solution for all testing needs. Client Services can create a specialized program for any neonatal unit.

Quick facts

Benefits of the CordStat[SM] test:

- has an equal or greater sensitivity than meconium for most drugs
- collection process is easier and quicker, so turnaround time is also faster
- universal sample that is always available
- less chain-of-custody issues

Benefits of the MecStat[SM] test:

- has a higher sensitivity for cocaine than other tests
- offers an alcohol biomarker to analyze exposure during pregnancy

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How hospitals can transition to the CordStat[SM] test