

## USDTL First to Obtain Specimens from the Virtual Repository of Dried Blood Spots

By Joseph Salerno, Scientific Copywriter, USDTL

USDTL is the first laboratory to be awarded specimens from the Virtual Repository of Dried Blood Spots (VRDBS), a new national database of dried blood spot (DBS) specimens available for use in research. DBS are collected from each newborn at the time of birth and used to screen for life threatening or serious conditions before symptoms begin.

### Trusted Research

VRDBS released the first 250 DBS specimens to USDTL in April of 2013. This first group of DBS included all live births from across the state of Iowa for a single day. The state of Iowa is the first state to make its DBS available for researchers to use.

“The Congenital and Inherited Disorders Advisory Committee to the Iowa Department of Public Health has endorsed this important newborn screening research,” said Kimberly Noble Piper, State Genetics Coordinator with the Center for Congenital and Inherited Disorders in the Iowa Department of Public Health. All identification of the DBS specimens has been removed prior to inclusion in the VRDBS to protect the privacy of the donor infants.

Entrusted with this first set of specimens, USDTL will use them to measure ethanol biomarkers in red blood cells using their BloodSpot<sup>®</sup> assay, and investigate prenatal alcohol exposure. Recent research from the laboratory of Ludmila Bakhireva, from the University of New Mexico Health Sciences Center, found a level of risky drinking behavior in pregnant women that was almost four times higher than national estimates at the Centers for Disease Control and Prevention (CDC).<sup>1,2</sup> Dr. Bakhireva’s results represent a small regional sample from the state of New Mexico. Research at USDTL using the DBS from Iowa will replicate Dr. Bakhireva’s work, but on a statewide level.

USDTL researchers hope to obtain DBS from other states to give the clearest picture of the prevalence of risky drinking during pregnancy across the United States. Current CDC

statistics for the level of maternal drinking while pregnant rely on self-report by pregnant women. Yet, research from a 2012 study conducted by Judith Hahn, with the Department of Medicine at the University of San Francisco, showed that more than 50% of women who drink (whether pregnant or not) will *not* reveal that they do so in self-report questionnaires.<sup>3</sup> USDTL’s research using DBS will measure the direct alcohol biomarker phosphatidylethanol (PEth) in the red blood cells from newborns, instead of relying on self-report of alcohol use, to uncover an unbiased and accurate picture of risky drinking during pregnancy. PEth is detected in red blood cells only when an individual has engaged in risky drinking behavior, or in the case of newborns, when the mother has done so.

### A National Research Tool

Established by the Newborn Screening Translational Research Network, the VRDBS is a web-based, open-source tool set up to help connect researchers with the various state newborn screening programs and make archived DBS available for research. Dried blood spots are a unique and potentially

powerful resource for pre- and perinatal researchers. Each state has its own set of storage and archiving standards for DBS after the initial newborn health screening has been completed, which makes it difficult for researchers to access these specimens. The VRDBS creates a central clearing house for the entire United States, helping researchers navigate their way through the various state regulations and standards.

### References

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## Maternal Tobacco Use May Indicate Other Harmful Substance Misuse

By Joseph Salerno, Scientific Copywriter, USDTL

Maternal smoking may be an indirect marker for other substance abuse risks to the health of a newborn. Research has shown that tobacco smokers are more likely to use illegal drugs and engage in risky drinking behavior.<sup>1</sup> As well, prenatal tobacco exposure (PTE) itself can cause severe health problems for a developing fetus, many of which have lifelong consequences for a child.

Tobacco users are seven times more likely than nonsmokers to try marijuana or cocaine, 14 times more likely to try crack cocaine, and 16 times more likely to try heroin.<sup>1</sup> These substances of abuse have a very high potential to harm a growing fetus. Research suggests children exposed to any of these substances in the womb may suffer from behavioral, cognitive, and neurodevelopmental problems as they grow. Maternal marijuana use in particular has been shown to predispose children to impaired attention, memory, and problem-solving skills during their adolescent years. Cognitive and memory impairment due to maternal marijuana use have been shown to persist into adulthood, at least as long as 22 years of age.

Babies exposed to cocaine, heroin, or crack during pregnancy often experience severe drug withdrawal symptoms following birth. Newborn withdrawal often results in separation from the mother, often for weeks, while the baby is monitored in the neonatal intensive care unit until withdrawal symptoms subside.

Tobacco use has also been shown to be an indicator of alcohol misuse in adults.<sup>2</sup> Smokers are 3-5 times more likely to be alcohol abusers than nonsmokers. Alcohol use during pregnancy may cause any number of harmful effects to the fetus, known collectively as fetal alcohol spectrum disorders (FASD). The most severe cases, resulting in fetal alcohol syndrome, can leave a child disabled to the point of needing lifelong support from professional caregivers.

In the most recent estimates from the Centers for Disease Control and Prevention, 13% of pregnant women reported smoking during the last three months of their pregnancy.<sup>3</sup> PTE is itself associated with numerous adverse newborn outcomes. Smoking has been associated with increased difficulty to conceive a child, adversely complicating the experience of childbirth even before it has begun.<sup>3</sup>

Smoking has been shown to be a risk factor for several prenatal complications including placental abruption, placenta previa, and premature water break. Maternal

smoking may cause miscarriage, premature delivery and low birth weight. Babies exposed to tobacco in the womb have also been shown to be more susceptible to sudden infant death syndrome.<sup>3</sup>

PTE is significantly associated with an increase in physical birth defects including cleft lip and palate, and clubfoot. A review of more than 173,000 cases of children with birth defects conducted by Hackshaw et al. (2011) found a significant correlation between maternal smoking during pregnancy and several severe physical birth defects including heart, lung, stomach, and nervous system defects.<sup>4</sup>

Smoking during pregnancy may result in inattention and antisocial behavior during early childhood.<sup>5</sup> Adolescent children experiencing PTE may be predisposed to attention deficit hyperactivity disorder, physiological changes in neurodevelopment, as well as addiction to nicotine.<sup>6</sup>

Maternal tobacco use can be detected by testing for cotinine, the metabolite of nicotine that is formed in the liver. Cotinine has a much longer half-life in the body than nicotine (16 hours vs. 2-3 hours respectively), and can be detected in both maternal and fetal tissues. In the mother, cotinine testing is carried out in urine, saliva, blood, hair, or nail samples, depending on the window

of detection required. In the newborn, cotinine from maternal smoking can be detected in umbilical cord tissue and cord blood, though the window of detection is much longer in cord tissue than in cord blood.

USDTL offers several methods to screen for cotinine exposure in newborns, as well as other drugs of abuse. Please contact our Client Services group at [clientservices@usdtl.com](mailto:clientservices@usdtl.com) or by phone at (800) 235-2367. Visit us at [www.USDTL.com](http://www.USDTL.com) for more information about cotinine testing and all our newborn testing services.



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## Maintaining Chain-of-Custody Protects Health Institutions and Newborns

By USDTL Staff

The movement and location of physical evidence from the time it is obtained until the time it is presented in court is the legal definition of chain-of-custody. The results of any newborn alcohol or substance of abuse test performed at USDTL may eventually be presented as evidence in a court of law, and this is why USDTL maintains universal chain-of-custody regardless of the client source of testing specimens. A court can exclude the results of a test if a chain-of-custody for the newborn sample was not maintained by the hospital and USDTL.

Chain-of-custody for specimens sent to USDTL is maintained as a chronological paper trail of collection and transfers of specimens throughout the testing process. The paper trail is signed and dated by each person who handles the specimen, both when they receive the specimen into their own hands, and when they hand it off to the next person in the process. Less transfers of a specimen that need to be documented is better for the chain-of-custody overall. A well maintained and legal chain-of-custody begins at the time of specimen collection and continues uninterrupted until test results have been presented in court, if necessary.

There are several key elements of the chain-of-custody for alcohol and drug test samples that must be present when samples arrive at USDTL. First, the specimen container must be sealed with an intact security seal. Next, the sample must be accompanied by a Chain-of-Custody and Control Form with an identification number matching the number on the specimen container. The Chain-of-Custody and Control Form is the first piece of the chain-of-custody paper trail. Thirdly, the Chain-of-Custody and Control Form must be signed and dated by an authorized agent from the client. If one or more of these elements are missing, USDTL must return the sample to the client.

An unbroken chain-of-custody ensures sample integrity in several ways that preserve the legal usefulness of alcohol and drug testing results. Chain-of-custody ensures that the original sample is the same as the one that is tested and ensures that the integrity of the sample is preserved during transport. Tampering, substitution, or alteration of the sample prior to being tested is prevented by the chain-of-custody process, which ensures that it has



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been handled only by the donor, a qualified collector, and lab testing personnel.

Maintaining chain-of-custody for newborn samples destined for alcohol and drug testing is a simple process, but all those who handle a drug testing specimen need to be vigilant about the process nonetheless. Diligent maintenance of chain-of-custody is always in the child's best interest. Unfortunately, it is only when the legal impact of an improperly maintained chain-of-custody is realized, that the full value of a well maintained chain-of-custody is understood. Ultimately, chain-of-custody protects the institution that is collecting the specimen, as well as the newborn whose health and well-being may rely on the results of a USDTL alcohol or drug test.

### References:

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### Upcoming Events:

- August 22-23 – Arizona Perinatal Trust Annual Conference – Flagstaff, AZ
- September 8-11 – 13th National Neonatal Nurses Conference / 16th National Mother Baby Nurses Conference – Las Vegas, NV
- September 13 – 8th Annual Association of Women’s Health, Obstetrics, and Neonatal Nurses Ohio Conference – Columbus, OH
- September 13 – Annual Association of Women’s Health, Obstetrics, and Neonatal Nurses Indiana Conference – Plainfield, IN
- September 23-25 – First International Conference on Prevention of FASD – Edmonton, Alberta, Canada

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