

The Challenges and Advancements in Newborn Drug-Exposure Testing

Gwendolyn McMillin, PhD, is a professor of pathology at the University of Utah School of Medicine and a medical director of Toxicology at ARUP Laboratories. She specializes in the detection of neonatal drug exposure and has seen increased demand for this type of testing, particularly to identify opioid exposure that may lead to neonatal abstinence syndrome (NAS). According to the Centers for Disease Control and Prevention, the incidence of NAS in the United States has increased 383% between the years 2000 and 2021.

ARUP has been offering drug testing in meconium, the first stool of the newborn, since 2004. In 2012, ARUP became one of the first commercial laboratories in the country to provide umbilical cord testing, where analysis involves more than 40 specific drugs and drug metabolites. "About seven years ago, we started looking for alternative specimens," recalls McMillin. The cord became the specimen of choice because of its practical size, easy transportability, and accessibility. "Every child comes into this world with one, and it can be sent for testing the minute the baby is born."



Expert Edge

Gwendolyn McMillin, PhD
Medical Director,
Toxicology and
Pharmacogenetics

Q: Are there national guidelines for testing to detect drug-exposed newborns?

A: No. While federal funding is available for the prevention, detection, and treatment of drug-exposed newborns, each state makes decisions about the specific practices. As such, the prevalence of biological testing to identify drug use and exposure varies substantially across the nation.

Q: What newborn specimens are used to detect drug exposure during pregnancy?

A: The most common newborn specimens for drug testing are meconium and umbilical cord tissue. Both specimens reflect drug exposure over approximately the last trimester of a full-term birth.

Q: Is there a preferred specimen for testing to detect a drug-exposed newborn?

A: Many studies demonstrate poor yield of urine drug testing for a newborn, which may be due to the short period of drug exposure reflected by urine. Meconium and umbilical cord tissue are usually comparable for drug detection, but the actual detection of drugs in these specimens depends on the stability of a drug over time in physiological conditions, maternal drug-use patterns, the quality of the specimen, and the performance capabilities of the analytical method employed for testing.

Consequently, drug-testing results may not be equivalent when testing different specimens from the same newborn. Furthermore, newborn drug-testing results may not correlate with results of maternal urine testing.

Q: Are drugs administered during labor and delivery detected in meconium and umbilical cord tissue?

A: Possibly. Studies have not specifically focused on the detection of drugs administered during labor and delivery in newborn specimens, but patterns of results suggest this may be the case. Drugs administered directly to the newborn after birth may also be detected in meconium. Distinct advantages of umbilical cord tissue over meconium include an easier collection process and the avoidance of iatrogenic medication detection.

Q: How might drug use during pregnancy affect a breastfed newborn?

A: The proportion of drug that enters the breastmilk varies based on the chemical and physical properties of that drug, as well as the drug-use pattern and maternal physiology. The Academy of Breastfeeding Medicine has published guidance for breastfeeding decisions when drug use is known.

For example, mothers who regularly use cannabis are generally discouraged from breastfeeding due to the observation that active drug concentrates in breast milk contribute to potentially dangerous drug exposure with breastfeeding. In contrast, mothers compliant with prescription methadone or buprenorphine therapy, who also demonstrate abstinence from other drugs, may be encouraged to breastfeed due to the low concentrations of active drug that appear in the breast milk.