The Detection of Prenatal Marijuana Exposure using Meconium and Umbilical Cord: A Comparison using Matched Pairs

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**INTRODUCTION**
For several decades, meconium has been the specimen of choice for *in utero* drug detection; however, there are several limitations such as low availability due to passage *in utero*, delayed passage, or discarded sample (intentional or unintentional). Umbilical cord (UC) is rapidly replacing meconium as the gold standard because it is a universal specimen, simple single-step collection, and its availability immediately following birth.

**OBJECTIVE**
The aim of this study is to compare the outcomes of matched pairs of meconium and UC for the presence of 11-nor-9-a-tetrahydrocannabinol (THCA), the principle metabolite of the main psychoactive ingredient in marijuana.

**METHOD**
A retrospective analysis of the testing records for 371 matched pairs of meconium and UC specimens. These specimens were forwarded to USDTL for the routine detection of *in utero* drug exposure between January 2016 and October 2016. Meconium specimens were screened using a EMIT Immunoassay method. UC specimens were screened using a ELISA Immunoassay method. Any positives were confirmed using gas chromatography – mass spectrometry methods.

**RESULTS**
Of the 371 matched pairs, 258 were negative for THCA and 85 were positive for THCA in both matrices. Only 17 were positive in UC and 11 were only positive in Meconium.

*UC Characteristics (using meconium as gold standard)*
- Sensitivity: 88.5%
- Specificity: 93.8%
- Positive Predictive Value: 83.3%
- Negative Predictive Value: 95.9%
- Results were positively, strongly, and significantly associated ($p = 0.624; P < 0.001$)

*Mean Concentrations*
- Meconium: 214.68 ng/g ± 293.78 ng/g
- UC: 2040.18 pg/g ± 4294.88 pg/g

**CONCLUSION**
This study suggests that Meconium and UC are comparable biomarkers for the detection of *in utero marijuana exposure*. Our comparison demonstrates sufficient sensitivity (88.5%) and specificity (93.8%). Although the concentrations of THCA in UC are 2 orders of magnitude less than the concentrations in meconium, there *exists a strong and significant association* between the concentrations of THCA in meconium and UC.

**CONFLICTS**
The contributors to this project are employed by United States Drug Testing Laboratories, a privately held commercial reference laboratory that is in the business of selling meconium and umbilical cord testing.

**REFERENCES**

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