Umbilical Cord Drug Testing: A Discussion of Prevalent Issues
OBJECTIVES

- Why umbilical cord?
- Advantages of umbilical cord?
- Common concerns
- Case studies & literature review
- Conclusions
- Questions
Why Umbilical Cord?

Client input
QNS – frustration with meconium

Insufficient specimen for testing
6.1% meconium specimens received

This is only part of the story!
<table>
<thead>
<tr>
<th>Year</th>
<th>Study</th>
<th>Enrolled</th>
<th>Unavailable</th>
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Why Umbilical Cord?

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<tr>
<th>Year</th>
<th>Study</th>
<th>Enrolled</th>
<th>Unavailable</th>
<th>%</th>
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Ucord Advantages?

- Universal sample
- Turn around Time
- Integrity of chain of custody
- Improved costs
UCord Advantages?

- Universal sample
  - Plenty of sample
  - 6” segment
  - 2 QNS over 10 years
  - Ideal for surveys
UCord Advantages?

- Turn Around Time
  - Collected at birth
  - 2-5 day head start
  - Lab time same as Mec
UCord Advantages?

- Turn Around Time

- Receipt: 9am-11am
- Screen: 11am-3pm
- Report Negatives: 3pm-5pm
- Confirm: 5pm-11am
- Report Positives: 11am-5pm
UCord Advantages?

- Turn Around Time

- Receipt: 9am-11am
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1 Day
UCord Advantages?

- Turn Around Time

  - Receipt: 9am-11am
  - Screen: 11am-3pm
  - Report Negatives: 3pm-5pm
  - Confirm: 5pm-11am
  - Report Positives: 11am-5pm

  1 Day

  2-3 Days
UCord Advantages?

- Integrity of ID
  - 1 mom
  - 1 baby
  - 1 collection
UCord Advantages?

- Lower costs
  - $150 savings
Whose cord is it?

- Belongs to baby
  - Stalk from the embryo
  - Forms during first 5 weeks
Detection Window?

- Experience vs Experiment*
- Matched with meconium
- Similar to meconium
- Approximately mid-term

* J. Gareri (2013) Society of Hair Testing Annual Conference, Toronto, Canada
What do the values mean?

- Is she taking it as prescribed?
- Is she abusing?
- When did she take it?
Case Studies

• Method validation paper
  • Opioid-dependent pregnant woman
  • Collected UCord
  • 75 mg Methadone daily
    ✓ Methadone 190.2 ng/g
    ✓ EDDP 43.6 ng/g

Case Studies

• **Method validation paper**

• **Salt Lake City, Utah**
  - 707 cords collected over 15 months
  - 38 specimens positive (5.4%)
  - All positive amp & methamp

What do the values mean?

- Testing a reservoir matrix
  - Cannot determine
    - Time
    - Dose
    - Frequency
What do the values mean?

- Appropriate Detection
- Time Window
- Yes or NO
Drug given during L&D?

- Yes – we may see them
  - Morphine
  - Dilaudid (hydromorphone)
  - Versed (midazolam)
Mom has a script for X?

- Is it in the profile
- Did she take enough
- Was she compliant
- Genetics
Mom has a script for X?

She says that she took X
so WHY is she negative?
Mom has a script for X?

She says that she took X so WHY is she negative

Wrong question!
Mom has a script for X?

The cord is positive for X

Is there a reasonable explanation

✅ The Right Question!
Discrepant Results?

- Urine
- Hair
- Meconium
- Umbilical cord
- Self Report
Discrepant Results?

- Different threshold to positivity
- Different detection window
- Different time to appear
- Recall bias / misclassification
Discrepant Results?

- Results do not refute each other
- Results are cumulative
Case Study

- Identical Twins
- Mother was given Dilaudid® (hydromorphone)
- Mother had history of cocaine use
- Cords collected for routine toxicology
- Baby 1
  - Cocaine negative
  - Hydromorphone positive
- Baby 2
  - Cocaine positive
  - Hydromorphone positive

Opiates

Heroin
(Diacetylmorphine)

6MAM
(Monoacetylmorphine)

Morphine
Opiates

Noscapine $\rightarrow$ Meconin

A Heroin Contaminant

Buprenorphine

- Part of a larger study
- Double-dummy, randomized
- Sublingual BUP 2mg each
- 24 mg per day maximum
- Cords collected
- Analyzed for all 4 BUP species

Buprenorphine

- Five (5) babies – 1 set of twins
- Days in study: 92 – 151 days
- BUP dosing at delivery: 18 – 24 mg
- Cum. 3rd Trimester dose: 1464 – 1396 mg

Buprenorphine

<table>
<thead>
<tr>
<th>Baby</th>
<th>*BUP (ng/g)</th>
<th>*NBUP (ng/g)</th>
<th>BUP-G</th>
<th>NBUP-G</th>
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<tbody>
<tr>
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<td>2.2</td>
<td>2.8</td>
<td>20.6</td>
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<tr>
<td>Twin 2</td>
<td>0</td>
<td>2.1</td>
<td>3.2</td>
<td>23.0</td>
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<tr>
<td>B</td>
<td>0</td>
<td>4.9</td>
<td>4.2</td>
<td>8.3</td>
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<tr>
<td>C</td>
<td>0</td>
<td>1.2</td>
<td>3.5</td>
<td>13.4</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>5.1</td>
<td>1.7</td>
<td>22.1</td>
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</tbody>
</table>

Cotinine

- Pacific Research Center for Early Human Development Study (PRCEHD)
- Cohort study linked to database
- Cords collected and stored @ 80°C
- 37 smokers and 38 controls

Cotinine

<table>
<thead>
<tr>
<th>Cutoff = 5 ng/g</th>
<th>Self Report POS</th>
<th>Self Report NEG</th>
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<tbody>
<tr>
<td>Sensitivity 27%</td>
<td>UC POS 13</td>
<td>UC NEG 1</td>
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<tr>
<td>Specificity 98%</td>
<td>UC NEG 36</td>
<td>UC POS 54</td>
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Our Findings at USDTL
4Q-2016 Ucord Prevalence Rates

$n = 12440$
CONCLUSION

• Umbilical Cord Testing
  o Gaining Popularity
  o Number of Advantages
  o Results similar to meconium
Thank You

Questions?

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Find me on LinkedIn, too!

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