The Missing Metabolite: How Unexpected Urine Drug Metabolite Patterns May Lead to False Interpretations

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CASE DESCRIPTION

A 31-year-old pregnant woman at 25-week gestation was admitted for preterm premature rupture of membranes and subsequently delivered preterm at 29 weeks. The patient insisted that she was unaware of the pregnancy and, thus, received no prenatal care. She had a clinically significant polysubstance abuse history: intravenous heroin, prescription amphetamine (Adderall), methamphetamine, tobacco, marijuana, and alcohol. There was also history of anxiety and postpartum depression following prior pregnancies. During her hospital stay, she entered into a medication-assisted treatment program and was prescribed buprenorphine (Subutex) for opiate addiction and fluoxetine (Prozac) for depression. On discharge, she entered a postpartum outpatient program for addiction treatment that required regular urine drug screen submissions with the goal of abstinence.

During an initial urine drug screen submission after admission into the treatment program, an immunoassay drug screen was presumptively positive for the amphetamines class with a cutoff of 300 ng/mL and negative for all other components. Confirmation by an inhouse liquid chromatography–tandem mass spectrometry (LC-MS/MS) assay yielded a methamphetamine measurement of 4990 ng/mL and undetectable concentrations of amphetamine with a limit of detection of 100 ng/mL (positive cutoff of 200 ng/mL). This atypical metabolite pattern was observed in subsequent drug screen/confirmation algorithms 2 weeks, 3 weeks, and 3 months after the initial occurrence. Chart review of previous methamphetamine screens and confirmations revealed typical metabolic patterns of high methamphetamine concentrations with detectable amphetamine presence (Table 1).

QUESTIONS TO CONSIDER
• How should metabolite patterns be incorporated in the clinical interpretation of drug confirmation results?
• Should specific concentrations of metabolites be present to report a positive methamphetamine concentration in a clinical drug testing setting?
• Why should medication lists be used in the clinical interpretation of drug confirmation results?
• What additional testing should be requested for the patient in this case?

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Table 1. Amphetamine confirmation result timeline.

Collection date	Amphetamine, ng/mL	Methamphetamine, ng/mL	Immunoassay result for amphetamines
4 months prior	2247	8390	Positive
4 weeks prior	15670	>50 000	Positive
Admission	<200	4990	Positive
2 weeks after	<200	1409	Positive
3 weeks after	<200	842	Positive
3 months after	<200	2891	Positive

Final Publication and Comments

The final published version with discussion and comments from the experts will appear in the September 2018 issue of *Clinical Chemistry*. To view the case and comments online, go to http://www.clinchem.org/content/vol64/issue9 and follow the link to the Clinical Case Study and Commentaries.

Educational Centers

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