



K54 False Positive Enzymatic Alcohol Results: Two Cases From 2014

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After attending this presentation, attendees will understand the chemistry behind Alcohol Dehydrogenase (ADH) -based assays and the potential for false positive results.

This presentation will impact the forensic science community by increasing awareness regarding this phenomenon and thus decreasing the potential for the release of false positive ethanol results.

Presented are two medical examiner cases from North Carolina where different hospitals reported positive ethanol results in children using ADH-based assays, while another laboratory's (headspace Gas Chromatography (GC)) ethanol results were negative. It has been reported in the literature that false positives from ADH-based assays can occur in combination with high levels of endogenous lactate and Lactate Dehydrogenase (LDH), in the presence of the excess NAD⁺ in the assay, thus producing NADH and a false-positive "ethanol" result. While presumed to be rare, in 2014, conflicting ethanol results occurred in two decedents with drastically different medical conditions. In both instances, there was a significant impact of the findings on the families, as social services became involved and accusations were made regarding family members and/or friends potentially administering alcohol to children.

By understanding the chemistry behind hospital ethanol testing, this presentation will provide the toxicology community with the knowledge of how enzymatic assays can produce false positive results. After reviewing the two cases, toxicologists will be able to better recognize the types of presentations that potentially will manifest such erroneous results.



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Case	#1	#2
Age/race/sex	6/B/M	2/B/F
Hospital Ethanol Result	76mg/dL 6/14/14 1557 52mg/dL 6/14/14 1704 39mg/dL 6/15/14 0359	53mg/dL 6/6/14 ~18:15
Abnormal Lab Results	pH= <6.80 (range: 7.35-7.45) Lactate >20.0 (range 0.6-1.8 mmol/L) % methemoglobin 1.9 (range 0.4-1.5%)	Anion Gap: 23 (range 3-15 mmol/L) ALT: 1404 (range 10-32IU/L) AST: 2322 (range 18-36IU/L) Potassium: 13.2 (range 3.5-5.1mmol/L) Sodium: 169 (range 134-143mmol/L)
Patient Timeline	Deceased ~15 hours after admission	Deceased in ER 6/6/14 17:57 ~1 hour after EMS was called
OCME Ethanol	Antemortem blood (6/14/14) & Urine (catheter): None Detected	Postmortem blood: None Detected
Cause of Death	Drowning	Bacteremia/sepsis

It is important that clinical laboratories utilizing enzymatic alcohol assays be aware of abnormal clinical lab tests that may result in, or contribute to, false positive or falsely-elevated ethanol results (such as either elevated lactate and LDH, or in the absence of a direct measurement, an anion gap or case circumstances at least minimally consistent with a significantly elevated lactate concentration). More conclusive testing methodologies, such as dual column headspace gas chromatography, should be considered for confirmation of ethanol results that may have significant forensic or legal consequences.

ADH-Based Assays, Lactate Dehydrogenase (LDH), Forensic Toxicology



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Buprenorphine, Breast Milk, Neonatal Abstinence Syndrome