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From: Ron Kirschner, MD, Medical Director
To: ALL HEALTH CARE PROFESSIONALS
Subject: Suspected toxic alcohol ingestion
Date: 3/15/16

- Ingestion of ethylene glycol (EG) from antifreeze, or methanol (MeOH) from windshield washer fluid or other sources, leads to anion gap metabolic acidosis (AGMA) from the acidic metabolites.
- Early presenters may have a normal AG but an increased osmole gap (OG) with measured > calculated osmolality. Calculated osmolality can be estimated using the formula $2 \times \text{Na} + \text{BUN}/2.8 + \text{glucose}/18 + \text{ethanol}/4.25$. If using the OG, it's essential to check ethanol, which can significantly affect osmolality.
- The OG is an inexact test. If intentional toxic alcohol ingestion is suspected, we recommend serum EG and MeOH levels as both can cause a similar AGMA, and histories may be unreliable. Samples are typically sent to a reference lab so that results are not available immediately.
- Fomepizole and ethanol inhibit metabolism of EG and MeOH. If intentional ingestion is suspected, we recommend starting fomepizole while EG and MeOH levels are pending.
- Because the half-life of MeOH is long (~52 hours) in patients receiving fomepizole, hemodialysis (HD) is usually recommended. Fomepizole dosing is typically adjusted during HD as it is cleared by dialysis.
- EG is cleared more efficiently by the kidneys, but HD is still recommended in cases of decreased kidney function, acidemia (pH <7.25) indicating presence of toxic metabolites, or EG >100 mg/dL (Davey).
- In patients with AGMA of unclear etiology, it may be reasonable to consider empiric fomepizole while EG and MeOH levels are pending – please call the poison center to discuss specifics of the case.
- Isopropyl alcohol (IPA) ingestion can cause CNS and respiratory ingestion, and increased OG, but without AGMA. Alcoholics will sometimes drink IPA as an ethanol substitute.
- Both EG and MeOH levels can be performed by Treasure Valley Labs (208-367-6392) through their affiliate in Spokane, WA, or by ARUP Labs in Salt Lake City (800-242-2787).

References

Carstairs S. Contribution of ethanol to the osmol gap: a prospective volunteer study. *Clin Toxicol* 2013; 51: 398.
Davey MP. Cost-effectiveness analysis of hemodialysis and fomepizole versus fomepizole alone in toxic alcohol toxicity without acidosis. *J Med Toxicol* 2015; 22: 6 (abstract 9).
Goldfrank's Toxicologic Emergencies 10th edition 2015, pages 1346-1368.

**Our certified nurse specialists in poison information and physician toxicologists
are available 24 hours a day to answer your questions.**