

Urine fluorescence in antifreeze poisoning

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DESCRIPTION

A 48-year-old man with diabetes mellitus and alcohol abuse presented to the emergency room (ER) with altered mental status, vomiting and abdominal pain. On examination, he was confused and uncooperative with a blood pressure of 70/40 mm Hg, heart rate of 66 beats/min, respiratory rate of 30 breaths/min and oxygen saturation of 95% on room air. Initial venous blood gas showed a 6.57 pH and PaCO₂ of 33 mm Hg. Laboratory investigation showed serum bicarbonate of 5 mEq/L, serum creatinine of 2.5 mg/dL (baseline creatinine 1.1 mg/dL), blood sugar of 200 mg/dL, anion gap of 29 mmol/L, delta ratio of 0.9, lactic acid of 21 mmol/L, a serum osmolality of 360 mOsm/kg and an osmolar gap of 44 mOsm; blood alcohol level was 0.053 g/dL, and urine was negative for ketones. Bedside examination of a urine samples (figure 1) and mouth under Wood's lamp showed blue–green fluorescence, which raised suspicion of ethylene glycol poisoning secondary to antifreeze ingestion. Serum level of ethylene glycol was found to be 133 mg/dL. Urinalysis showed cigar and dumbbell-shaped calcium oxalate crystals.

The toxic metabolites of ethylene glycol are glycolic acid and oxalic acid. Glycolic acid causes a high anion gap metabolic acidosis due to inhibition of cellular respiration.¹ Glycolic acid can also cause false elevation of lactate on blood gas measurements.² Most antifreeze preparations have added fluorescein to help detect radiator leaks, and fluorescence of the urine sample under ultraviolet light will be evident.³ Hence, urine fluorescence can be a helpful aid in bedside diagnosis of ethylene glycol poisoning. However, it should be used with caution, and results should be interpreted in the clinical context. Sodium fluorescein fluorescence is dependent on urine pH <4.5 and has a half-life of just

over 4 hours allowing for potential false-negative results.¹ Food products, toxins and drugs can cause urine fluorescence, or urine bags may have native fluorescence, leading to false-positive results.^{1–3} Urine in the paediatric population may show fluorescence in the absence of antifreeze.⁴

This patient received fomepizole, sodium bicarbonate, thiamine, intubation for airway protection and emergent haemodialysis. The antifreeze ingestion was thought to be accidental. He made an excellent recovery and was discharged home after 4 days.

Learning points

- ▶ Ethylene glycol is an active ingredient in commercial antifreeze, and ethylene glycol poisoning classically causes high anion gap metabolic acidosis with high osmolar gap.
- ▶ Most antifreeze preparations have added fluorescein to help detect radiator leaks and show a green–blue fluorescence under ultraviolet light.
- ▶ When antifreeze ingestion is suspected in the emergency room, Wood's lamp examination of the patient's mouth, vomitus, urine or clothing can aid in rapid diagnosis. However, this examination should be used with caution given potential for false-negative and false-positive results.

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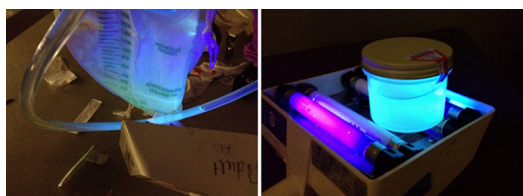


Figure 1 Urine sample showing blue–green fluorescence under ultraviolet light.

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