

**The diagnosis and treatment of ethylene glycol poisoning** Jenkins A,<sup>1,2</sup> Amato R<sup>1</sup> and Xiong Y<sup>2</sup> <sup>1</sup>Quest Diagnostics, Marlborough, MA and <sup>2</sup>UMass Memorial Medical Center, Worcester, MA

**Background:** In the US ethylene glycol (EG) contributes approximately 2% of all significant poisonings. The time of exposure to treatment is one factor which affects mortality. Therefore, timely diagnosis is critical to successful treatment outcomes. Many laboratories do not have the testing capabilities to provide EG analysis in acute settings. We describe a gas chromatographic-mass spectrometric procedure (GC/MS) for the quantitative determination of EG and its application to a case.

**Methods:** Serum samples were subjected to protein precipitation with the addition of internal standard (IS) 2,3 butanediol in acetonitrile. After centrifugation at 14,000 rpm for 10 minutes the supernatant was transferred to GC autosampler vials with inserts. Analysis was performed on a Agilent 7890 GC with a Zebron ZB-WAXplus 30 m x 0.25mm, 0.25µm film thickness capillary column (Phenomenex) and an Agilent 5975 MS operated in selected ion monitoring mode. The assay was calibrated daily with a standard at 200 mg/L with quality controls at 0, 400, 800 mg/L. The lower reporting limit was 100 mg/L. The following ions [quantitative, qualifiers] were monitored for EG and IS, respectively- 31,33, 43; 45,57,29.

A 54 year old female presented to the emergency department for intentional antifreeze ingestion. Her past medical history was significant for leukemia, anxiety, depression and autoimmune neutropenia.

**Results:** Calibration curves were linear from 100-10,000 mg/L with  $r^2 > 0.99$  and good reproducibility (<10%CVs). Propylene glycol, 1,4 butanediol, ethylene diglycol, 1,3 propanediol, formic acid, glycolic acid, glyoxilic acid and oxalic acid did not interfere with the assay.

The patient was intubated, received fomepizole and a bicarbonate drip started. An initial serum specimen was positive for EG (8501 mg/L) with a 4 h STAT turnaround time (TAT). Hemodialysis was initiated and the patient received 3 treatments, resulting in declining serum EG concentrations (day 2AM: 2560 mg/L, day 2PM: 987 mg/L). On day 5 [EG] was < 100 mg/L.

**Conclusions:** We have described a GC/MS assay for EG which achieved a 4 h STAT TAT and was a useful tool in the clinical management of a patient by monitoring the effectiveness of treatment.

**Key Words:** Ethylene glycol, toxic alcohols, mass spectrometry