2018 ACMT Annual Scientific Meeting
FIT MedTox Shark Tank Research Forum

Presentation 3

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Title: Correlation of Ethylene glycol toxicity and blood pressure elevation in a rat model

Background: Ethylene glycol is a toxic alcohol that if ingested, it will cause inebriation, CNS depression, anion gap metabolic acidosis, renal failure and can lead to death. Poison centers frequently called by physicians if there is an ethylene glycol poisoning case for recommendations and treatment plans. In a prior review of our poison center data and in review of published case reports, an association was seen between acute ethylene glycol intoxication and blood pressure elevation in human patients.

Aims: We have three primary aims for this study:

1. To determine if there is a relationship between blood pressure elevation and acute ethylene glycol intoxication in an animal model.
2. Determine if there is a relationship between anion gap metabolic acidosis and blood pressure elevation.
3. Evaluate renal tissue samples from sacrificed, poisoned mice to determine if the degree of renal crystal deposition correlates with the degree of blood pressure elevation.

Method: We will conduct a prospective animal study using male Wistar rats as they have shown to have high sensitivity to ethylene glycol induced renal injury (Cruzan et al. 2004) with an LD50 of around 12,900 mg/kg (https://www.atsdr.cdc.gov/toxprofiles/tp96-c3.pdf). We plan to divide male Wistar rats into four groups and administer ethylene glycol by oral gavage at a dose of 0.5 LD50, LD50, and LD100, respectively, with one control group. We hypothesize that a 30% increase in mean arterial blood pressure (MAP) is significant to say that acute ingestion of ethylene glycol will cause an increase in blood pressure. A sample size of 16 animals was calculated to achieve an 80% power to detect a 30% increase in MAP with an alpha of 0.05. An additional animal will be added to each group to give a total sample size of 20 animals. Prior to ethylene glycol administration, invasive blood pressure monitors will be placed in the carotid artery. Continuous blood pressure monitoring will be done over the course of 8 hours, with measurements recorded every 20 minutes during the course of the study. At the end of 8 hours, animals will be sacrificed using CO2 exposure and kidneys will be removed and paraffin embedded for histology.

Major Limitation/ Questions: This study will be an animal study which may not correlate with human toxicity We plan to watch for an increase in blood pressure over 8 hours post ingestion,

it may take longer for an animal to have an elevated blood pressure. The sample size was based on anticipated blood pressure elevation and not crystal deposition. Therefore we may not detect a correlation between tissue crystal burden and blood pressure elevation.