extremity followed by normal saline infused from a height of 100 cm. The flow rate was not allowed to exceed 500 mL/hour over the four-hour study period. Either 10 mg morphine sulfate or 1.5 mg of hydromorphone (per patient preference) was administered SC every 15 minutes for 4 hours, unless Numeric Rating Scale pain intensity scores fell to less than 5, or Ramsey Sedation Scores exceeded 4. Pain intensity (11-point scale) and pain relief (−1=worse, 0 =none, 1=slight, 2=moderate, 3=a lot, and 4=complete relief) were recorded every hour. Total morphine equivalents and volumes of infused saline were recorded. Total pain relief (TOTPAR), defined as the sum of hourly pain relief scores, was calculated. The study was institutional review board-approved and all subjects gave written informed consent.

Results: From May 15, 2008 to January 4, 2009, 34 patients made 107 separate emergency department (ED) visits for SCDAPE, and 10 unique patients (30% of all patients) were enrolled. Of 24 patients not enrolled, only 4 (12% of all eligible candidates) refused to participate. 20 potential subjects either presented after hours or on weekends (18 subjects), with pain scores of less than 7 (1 patient), or were missed by our staff (1 patient). Mean age of the 10 enrolled subjects was 33 years and 4 were female. Baseline and 4-hour mean pain intensity scores were 9.2 and 6.9, and the mean 4-hour TOTPAR score was 4.5 (of a maximum 16). Subjects received a mean total of 109 mg morphine equivalents and 846 mL normal saline (212 mL/hour) over the 4-hour study period. Mild adverse effects were reported by 6 patients (swelling or stinging at the infusion site). No adverse effect required discontinuation of the infusion.

Conclusion: Protocol-driven recombinant hyaluronidase-enhanced SC hydration and opioid administration for adults presenting to the ED with SCDAPE is a feasible and well-tolerated intervention resulting in adequate hydration and opioid administration rates. Few patients refused enrollment. Changes in pain intensity were minimal and pain relief scores were low, despite large opioid doses. Results of this study will assist in the development of future randomized, controlled trials.

405 Prophylactic Etoricoxib Prevents Yom Kippur Headache: A Placebo-Controlled Double Blind Trial

Drescher MJ, Alpert EA, Zalut T, Torgovicky R, Wimpfheimer Z/Hartford Hospital/University of Connecticut, Hartford, CT; Sheba Medical Center, Ramat Gan Israel, Israel; Shaare Zedek Medical Center, Jerusalem, Israel; MSD Israel, Tel Aviv, Israel

Study Objectives: Religious fasting is associated with headache. This has been documented as "Yom Kippur Headache" and "First-of-Ramadan Headache."

Rofecoxib (Vioxx®) a Cox-2 inhibitor with a 17-hour half-life, has been shown effective in preventing fasting headache when taken just prior to the 25-hour Yom Kippur fast. However, rofecoxib is no longer an available treatment option for patients. We hypothesized that another Cox-2 inhibitor with a longer half-life, Etoricoxib (Arcoxia®), would also be effective in preventing headache, providing another treatment option for patients.

Methods: We performed a double-blind randomized prospective trial of Etoricoxib 120mg vs placebo, taken just prior to the onset of fasting, Yom Kippur 2008. Healthy adults aged 18 – 65 were enrolled from the community. Subjects completed a demographic data form and questions regarding headache history and a post-fast survey on headache during the fast. They were queried as to headache intensity, time of onset of headache, general ease of fasting and side effects. The institutional review board approved the study.

Results: We enrolled 211 patients. 195 completed the post-fast questionnaire (92%). Of those subjects receiving etoricoxib (n=99), 36 or 36.4% vs 65 or 67.7 % of the placebo group (n=96) developed headache during the fast ($p<.0001$). Median severity of headache in the treatment group was significantly less for the treatment group (3.0 vs 5.0 on a visual analog scale of 10 ($p = .024$). Participants in the treatment group reported an easier fast compared to previous fasting experience. (4.0 vs. 3.5 on a scale of 1 to 5 ($p<.0001$).

Conclusion: Etoricoxib 120mg taken prior to a 25-hour ritual fast prevents and attenuates fasting headache.

406 Transbuccal Fentanyl for Rapid Relief of Orthopedic Pain in the Emergency Department

Shear ML, Adler JN, Shewakramani S, Ilgen J, Soremekun O, *Nelson SW,* Thomas SH/Massachusetts General Hospital, Boston, MA; Brigham and Women's and Massachusetts General Hospital, Boston, MA; University of Oklahoma, School of Community Medicine, Tulsa, OK

Study Objectives: To assess time required to achieve a 2-point decrease in pain using a verbal 0-to-10 scale with transbuccal fentanyl compared to oxycodone/acetaminophen (O/APAP) by mouth for patients with orthopedic extremity injury. Secondary endpoints assessed pain relief magnitude, rescue medication rate and subject preference for future medication.

Methods: Prospective, double-blind, placebo-controlled design was used in the emergency department (ED) of an academic medical center with a convenience sample of 60 adult patients presenting with isolated extremity injury and pain concerning for fracture. Institutional Review Board and U.S. Food and Drug Administration Investigational New Drug approvals were obtained. Sample size calculations were based on the primary endpoint. Subjects received either transbuccal fentanyl 100 mcg and a swallowed placebo, or a swallowed O/APAP 5/325 mg pill and a non-analgesic transbuccal comparator. Pain was assessed every 5 minutes for an hour and vital signs were monitored for two hours.

The primary endpoint, time to significant analgesia, was analyzed using the Kaplan-Meier product-limit procedure, with pairwise comparisons executed using log-rank testing. The secondary endpoint of depth of analgesia, was analyzed with nonparametric techniques (Kruskal-Wallis testing).

Results: Transbuccal fentanyl achieved the primary endpoint sooner than O/APAP (median 10 vs. 35 min, $p < .0001$). Transbuccal fentanyl was also statistically superior for all secondary endpoints, though with wide confidence intervals due to sample size. There were no significant changes in vital signs and no hemodynamic or respiratory intervention was needed in any patient. Nausea occurred only in the O/APAP group and was "slight" in all cases except one in which vomiting occurred. No other significant side effects occurred in the ED or were reported at 100% next-day follow-up.

Conclusion: Transbuccal fentanyl provides faster pain relief onset than O/APAP for orthopedic extremity injury. Further investigation is warranted, as it appears to provide rapid, significant and safe analgesia.

407 Pain Management During Intraosseous Infusion Through the Proximal Humerus

Philbeck T, Miller L, Montez D/Vidacare Corporation, San Antonio, TX

Study Objectives: Intraosseous (IO) vascular access involves inserting a needle into the intramedullary space for administering fluids and/or drugs. Two conditions must be met for optimal IO flow rates in most cases. One must flush the IO space under high pressure with a syringe, and an IV pressure bag capable of generating 300mmHg pressure or a standard IV infusion pump is required. But the initial flush and subsequent pressure required to infuse fluids usually cause significant pain in the extremity receiving the infusion. This requires intraosseous pain relief using medication such as 2% preservative-free lidocaine injected directly into the IO space. A study was designed to determine optimal lidocaine dosing and sequencing for patients receiving fluids through the intraosseous route and to determine if adequate fluid flow rates can be delivered through the proximal humerus IO site.

Methods: The study was approved by IntegReview institutional review board and healthy, pain-free, adult volunteers were consented. IO catheters were placed in the proximal humerus. Incremental doses, up to 80mg, of lidocaine were injected followed by a hard flush of normal saline delivered by syringe and a post-flush injection of 40mg of lidocaine. Following each injection, the infusion pressure was gradually increased, and Visual Analog Scale (0–10) pain levels were assessed along with IV flow rates.

Results: Ten volunteers participated: 7 female, 3 male; mean age 33.0±2.6 years (range: 21–48 years). All IO insertions were successful on the first attempt. Mean IO insertion VAS score was 3.9±1.5 and mean removal VAS score was 2.2±2.9. After the initial 20mg of lidocaine, the highest VAS score was 2.0±1.2 (range: 0–4), at 300mmHg of pressure. At this point, infusion pressure had a significant effect on the level of pain experienced by participants ($p<.001$). Following all additional injections, the effect of pressure on pain levels was non-significant, indicating effective pain relief. The highest calculated IV infusion rate was 761±363mL/hr; however, the flow rate for two subjects was too fast to measure.

Conclusions: For adequate IO infusion rates with minimal and tolerable pain, 40mg of preservative-free lidocaine may be needed, followed by a rapid normal saline syringe flush of at least 10mL. Additional dosing and flushing may be required. Ultimately, EMS medical directors or the attending emergency physician must determine the appropriate dosage of lidocaine. For humeral insertion, a longer IO needleset should be considered.