

# Acute Effects of TASER<sup>®</sup> X26 Discharges in a Swine Model

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**Background:** Very little objective laboratory data are available describing the physiological effects of stun guns or electromuscular incapacitation devices (EIDs). Unfortunately, there have been several hundred in-custody deaths which have been temporally associated with the deployment of these devices. Most of the deaths have been attributed to specific cardiac and metabolic effects. We hypothesized that prolonged EID exposure in a model animal system would induce clinically significant metabolic acidosis and cardiovascular disturbances.

**Methods:** Using an IACUC approved protocol, from March through June 2006 in a teaching hospital research setting, 9 standard pigs (6 experimentals and 3 sham controls) were anesthetized with ketamine and xylazine. The experimentals were exposed to two 40 sec discharges from an EID (TASER X26, TASER Intl., Scottsdale, AZ) across the torso. EKGs, blood pressure, troponin I, blood gases, and electrolyte levels were obtained pre-exposure and at 5, 15, 30 and 60 min and 24, 48 and 72 hrs post-discharge. P values < 0.05 were considered significant.

**Results:** Two deaths were observed immediately after TASER exposure from acute onset ventricular fibrillation (VF). In surviving animals, *heart rate* was significantly increased and significant hypotension was noted. Acid-base status was dramatically affected by the TASER discharge at the 5 min time point and throughout the 60 min monitoring period. Five min post-discharge, central venous *blood pH* ( $6.86 \pm 0.07$ ) decreased from baseline ( $7.45 \pm 0.02$ ;  $p=0.0004$ ).  $PCO_2$  ( $94.5 \pm 14.8$  mmHg) was significantly increased from baseline ( $45.3 \pm 2.6$  mmHg). Bicarbonate levels significantly decreased ( $15.7 \pm 1.04$  mmol/L) from baseline ( $30.4 \pm 0.7$  mmol/L). A large, significant increase in *lactate* occurred post-discharge ( $22.1 \pm 1.5$  mmol/L) from baseline ( $1.5 \pm 0.3$  mmol/L). All values returned to normal by 24 hrs post-discharge in surviving animals. A minor, non-significant increase in *troponin I* was seen at 24 hrs post-discharge ( $0.052 \pm 0.030$  ng/ml, mean  $\pm$  SEM).

**Conclusions:** Immediately following the discharge, two deaths occurred due to VF. In this model of prolonged EID exposure, clinically significant acid-base and cardiovascular disturbances were clearly seen. The severe metabolic and respiratory acidosis seen here suggests the involvement of a primary cardiovascular mechanism.