

Breathing Parameters, Venous Blood Gases, and Serum Chemistries with Exposure to a New Wireless Projectile Conducted Electrical Weapon in Human Volunteers

Jeffrey Ho, MD¹, Donald Dawes, MD², Mark Johnson, BS³, Erik Lundin, BS³, James Miner, MD¹

¹Dept. of Emergency Medicine, Hennepin County Medical Center and the University of MN, Minneapolis, MN, USA

²Dept. of Emergency Medicine, Lompoc District Hospital, Lompoc, CA, USA

³Division of Technical and Medical Research, TASER International, Scottsdale, AZ, USA

INTRODUCTION:

The TASER X26[®] conducted electrical weapon (CEW) has a maximum range of 35 feet, limiting its effectiveness in some tactical situations. TASER International has developed a non-tethered CEW, the XREP is fired from a 12-gauge shotgun and has a range of 65 feet.

A previous study showed that the TASER X26 had no significant effect on tidal volume, respiratory rate, PETCO₂, and PETO₂.

The purpose of this study was to study the effects of the XREP on respiration, venous blood gases, and certain blood chemistries.



METHODS:

Subjects had venipuncture prior to the application of the CEW and immediately after the exposure, and venous samples were analyzed to obtain venous pH, pCO₂, HCO₃, lactate, as well as Na and K.

Breathing data was collected by a breath by breath gas-exchange system. All subjects were exposed for a minimum of 15 seconds. Exposure was thoraco-abdominal with one lead over the pectoralis major muscle, and the other in the upper abdomen, 16 inches away.

In 27 subjects, the device was programmed for a 45-second exposure. The subjects could terminate the exposure with a “tap out” button after 15 seconds.

In 23 subjects, the exposure was fixed at 20 seconds. In 4 of these subjects, the device was programmed to deliver 2 exposures. The first exposure was the standard thoraco-abdominal exposure, and the second was between the contra-lateral abdomen and the thigh.

RESULTS:

Fifty (50) subjects completed the study. The analysis was separated into two groups. The first was the self-terminating group (variable time exposure). In this group, respiratory rate and minute ventilation increased significantly during the exposure. End-tidal CO₂ decreased significantly during exposure. Venous pH decreased by 0.023, pO₂ increased by 13.4, HCO₃ decreased by 2.8, lactate increased by 2.4, and potassium decreased by 0.13.

The second group was the fixed 20-second exposure (including the 4 with the “double” exposure). In this group, respiratory rate and minute ventilation increased significantly during the exposure. End-tidal CO₂ decreased and end-tidal O₂ increased significantly during exposure. Venous pH did not significantly change. pCO₂ decreased by 4.0, p O₂ increased by 16.3, HCO₃ decreased by 3.4, and lactate increased by 2.7. Chemistries had no significant change.

CONCLUSIONS:

This study demonstrates that the new CEW has no important deleterious effects on respiratory parameters, blood chemistries, or venous blood gases. These results are consistent with previous results for the TASER X26 CEW.

