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

Jeffrey Ho, MD[1], Donald Dawes, MD[2], Mark Johnson, BS[3], Erik Lundin, BS[3], James Miner, MD[1]

[1]Dept. of Emergency Medicine, Hennepin County Medical Center and the University of MN, Minneapolis, MN, USA
[2]Dept. of Emergency Medicine, Lompoc District Hospital, Lompoc, CA, USA
[3]Division 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,

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:

The results suggest a significant greater level of activation of the SAM cascade with O.C. compare 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.d to the CEW. Overlapping confidence intervals preclude a definitive statement about the other measurements, but do not suggest a greater activation of the stress cascade by the CEW than O.C.

Given that the CEW is generally considered more efficacious in the control of subjects with impaired nocioception secondary to drug intoxication or an excited delirium, and that it induces a smaller or equal stress response, it maybe the use of force of choice in certain settings.

The American College of Emergency Physicians, Seattle, Washington, October 2007