

The Neuroendocrine Effects of the TASER X26 Conducted Electrical Weapon as Compared to Oleoresin Capsicum

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:

Conducted electrical weapons (CEW) induce neuromuscular incapacitation and pain by the application of an electrical current. The electrical current stimulates both afferent sensory neurons causing pain and efferent motor neurons causing muscle tetany.

There has been controversy in the lay press and medical literature with regard to the use of these weapons and sudden, unexpected in-custody death. There has been speculation that exposure to the discharge of a CEW may induce neuroendocrine effects (e.g., a stress cardiomyopathy) which might predispose subjects to delayed malignant cardiac arrhythmias and sudden death.

The objective of this study is to compare the neuroendocrine effects of the TASER X26 CEW to oleoresin capsicum (O.C.), commonly referred to as pepper spray. The latter is a well accepted use of force alternative.

METHODS:

Subjects were randomized to receive either a 5-second exposure from the TASER X26 CEW with the probes fired into the back from about 7 feet or a 2-second spray of O.C. to the eyes.

Subjects had salivary samples collected by passive drool through a straw 10-15 minutes before the exposure, and at 10, 20, and 60 minutes after the exposure. Salivary samples were analyzed for quantitative measures of alpha-amylase (surrogate for sympathetic-adrenal-medulla (SAM) axis stimulation, peak at 10 minutes) and cortisol (surrogate for hypothalamic-pituitary-adrenal (HPA) axis stimulation, peak at 20 minutes).



RESULTS:

10 subjects were randomized to the O.C. exposure, and 5 subjects were randomized to the CEW exposure. There was a 173% increase in alpha-amylase in the O.C. group at 10 minutes compared to an 8% decrease in the CEW group. This was a significant difference.

Non-significant results (by overlapping confidence intervals) included: 1) at one hour, alpha-amylase was 44% over baseline in the O.C. group and 9% over baseline in the CEW group, 2) there was a 89% increase in cortisol in the O.C. group at 20 minutes and a 90% increase in the CEW group, 3) at one hour, cortisol was 15% over baseline in the O.C. group and 68% over baseline in the CEW group.



CONCLUSIONS:

The results suggest a significant greater level of activation of the SAM cascade with O.C. compared 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 nociception secondary to drug intoxication or an excited delirium, and that it induces a smaller or equal stress response, it may be the use of force of choice in certain settings.