The Neuro-Endocrine Effects of the TASER X26 Electronic Control Device

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Introduction
This is the first study to examine the human stress response to Electronic Control Devices (ECD), Oleoresin Capsicum (O.C.), a cold-water tank immersion, and a defensive tactic drill.

Methods
Subjects received either a five-second exposure from the TASER® X26™ ECD with the probes fired into the back from seven-feet; a five-second spray of O.C., a skin and mucous membrane irritant, to the eyes; a 45-second exposure of the hand and forearm in a 0°C cold water tank; or a one minute one-on-one defensive tactics drill.
Salivary alpha-amylase, a measure of the sympathetic-adrenal-medullary axis of the human stress response (versus sympathetic tone), and salivary cortisol, a measure of the hypothalamus-pituitary-adrenal axis of the human stress response, was collected by passive drool before and after the exposures and analyzed by Salimetrics, Inc. (State College, PA).

Results
Subjects were enrolled with 16 each in the ECD and cold-water tank groups, and ten each in the O.C. and defensive tactics groups. The mean ages was 43 for the cold-water tank group; 35 for the ECD group; 28 for the O.C. group; and 45 for the defensive tactics drill.
The defensive tactics drill resulted in the greatest change in salivary alpha-amylase at 10 - 15 minutes with a change of 63.8 U/mL. O.C. was next with a change of 37.4. The ECD and cold-water tank immersion did not appear particularly activating.
O.C. had the greatest change in salivary cortisol at 15 - 20 minutes with a change of 0.5 mcg/dL. The ECD was next with a change of 0.38, and the defensive tactics drill after that with a change of 0.25. The defensive tactics drill had the greatest delayed change from baseline in cortisol with a change of 0.47. The cold-water tank immersion did not appear particularly activating.

Conclusions
Our preliminary data suggests that physical exertion during custodial arrest may be most activating of the human stress response.

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