

Hennepin County



Medical Center



The Physiologic Effects of Multiple Simultaneous Electronic Control Device Discharges

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Introduction

Electronic control devices (ECDs) are utilized by law enforcement and military to control non-compliant and actively resistive subjects. The TASER® Shockwave™ device is a new ECD designed specifically as an area denial device.

It operates as a remotely triggered stationary platform that saturates a target area with multiple ECD electrical circuits.

This is the first study to examine the effects of multiple simultaneous device discharges in humans.

Methods

Sixteen human volunteers were exposed to multiple (two - three), simultaneous five-second discharges from a Shockwave device. Applications were to the chest, back, chest to abdomen, or thighs.

Blood was analyzed before and after discharge for pH, lactate, potassium, CK, and troponin. Continuous spirometry was performed.

In addition, ECGs before and after discharge were recorded and echocardiography was used to determine the rhythm during discharge.



Results

There were no statistical or clinically important changes in pH. There were small elevations of lactate (mean change of 2.44 immediately after the exposure for two exposures, 0.93 for three exposures). There were moderate increases in CK at 24 hours (mean change 381 for two exposures, 843 for three exposures).

There were no clinically important or statistically significant changes in potassium. Troponin, drawn pre, immediately post, and at 24 hours, was always within the reference range for the i-STAT device. There was a trend to a decrease in minute ventilation in the subjects with chest or back exposures (two devices) although it did not reach statistical significance.

The electrocardiogram changes only reflected some increased vagal tone after the discharge. There were no important rhythm changes. In four of the

six subjects, the echocardiographer was able to determine that the rhythm during discharge was sinus. In two subjects, motion artifact precluded this. One of these subjects had a heart rate during the exposure of 79, not suggesting electrical capture.



Conclusions

Five-second, simultaneous, multiple exposures to the TASER Shockwave device do not appear to have significant deleterious effects on human physiology except for a moderate increase in CK.

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