CATECHOLAMINES IN SIMULATED ARREST SCENARIOS

Lundin, Erik J*, Dawes, Donald M*, Ho, Jeffrey D*, Ryan, Frank J., Miner, James R.*
* University of Louisville, Louisville, KY
^ Hennepin County Medical Center, Minneapolis, MN
+ Lab Corp, Phoenix, AZ

Study Objectives
The mechanisms of death in many arrest-related deaths are unclear. Law enforcement devices or tactics are often scrutinized in these unexplained cases. Unexplained arrest-related deaths have occurred after the use of electronic control devices. The primary concern has been direct cardiac arrhythmias induced by the delivered charge. Some authors have opined that the temporal relationship between electronic control device use and arrest-related deaths may be related to an acute stress cardiomyopathy induced by high circulating catecholamines, rather than an immediate electrically-induced arrhythmia. In this study, we compared the stress response during several simulated use of force encounters.

Methods
This was a prospective, observational study of human subjects. The subjects were a convenience sample of law enforcement officers receiving a training exposure or TASER employees. Subjects were randomized to one of five groups: 1) a 150 meter sprint, simulating flight from law enforcement officers, 2) 45 seconds of hitting and kicking a heavy bag, simulating physical combat with law enforcement officers, 3) a 10-second TASER X26 exposure, 4) a K-9 training exercise of approximately 30 seconds, and 5) an oleoresin capsicum (O.C.) exposure to the face. Subjects had an intravenous catheter placed by a physician or paramedic prior to the test. Baseline catecholamines (epinephrine, norepinephrine, dopamine, and total) were drawn at that time.
Subjects then participated in their assigned task. Catecholamines were drawn immediately (within 30 seconds) after the task and every 2 minutes for 10 minutes.

Conclusions
The comparison of use of force encounters demonstrated that the TASER X26 was one of the least activating of catecholamines while the simulated combat was one of the most activating of catecholamines. The authors recommend further study in this area to assist law enforcement officers in determining the best tactics and devices to utilize in arrest scenarios that have higher likelihood of being associated with an arrest-related death.