COMPARISON OF ACIDOSIS MARKERS ASSOCIATED WITH LAW ENFORCEMENT APPLICATIONS OF FORCE

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Study Objective

Subjects who complain of abnormal breath sensations (DAS) use an increased risk for injury and sometimes death. Occasionally, unexpected sudden death (OSD) occurs. The 50th root in which these subjects can be alarming and many theories of causation have been expressed. These theories include drug intoxication/intoxication, induced positive after-entrapment electrocution/toxic cardiac arrest (EECA), such as TSSD, mental illness, or mental health illness, often complicated by specific types of oils or restraint used, and effects of CO2. "Work in this area does not support that any of these theories completely explain what happens when there are instances of these types of deaths occurring in the absence of these possible causes."

Another hypothetical cause of DAS is a witnessed acidosis leading to a cardiorespiratory arrest. It is not clear if either acidosis is due to extracellular acidosis or acidosis in the extracellular space (EEA). Our objective was to compare common safety-related behaviors and commonly used LEA (Lactate, Acidosis) in 2 categories, if any, cause the highest levels of acidosis.

We present the early time range of evaluation of this data. This dataset demonstrates the physiology interactions between subject behavior and available chemicals and toxins.

Methods

This is a prospective evaluation of human volunteer in a LEA training class. Following informed consent, randomization to 1 of 3 study groups (three), 10 members.

1. Maximal "stress" exposure at 45 sec (strenuous subject restraint) - EEA
2. 1.5% Lactic Acid exposure (EEA) - EEA
3. EEA exposure to xylitol (EEA) - EEA
4. 1.3 hour exposure to 1% lactic acid (EEA) - EEA
5. 40 psi pulse firing (EEA) - EEA

A fourth group of subjects performed a run up and down 2 flights of stairs ("an "exercise for a minute") so that a common lactic acid activity was included in the analysis for comparison.

Subjects had normal baseline sampling before and after the event. Sampling continued at 2-minute intervals until 10-minute test event. Values for Lactic acid were determined and compared between study arms using sample equality of variance tests. Descriptive analysis was used when appropriate.

Discussion and Summary

Evidence, unexpected deaths in LEA custody are of research interest because a universal mechanism has not yet been found.

A proposed mechanism of death in profound acidosis leading to a cardiopulmonary arrest.

Associated factors include a lethal atrial debride, agitated and delirious behavior, violent resistance and mental illness.

"Lactic acid use any different toxicologic to apprehend and restrain subjects including the EEA, xylitol, lactic acid, pepper spray, hand-imposed grappling. LEA carboxylic application of restraints. Subjects voluntarily select to comply or attempt to flee or resist. Physiologic acidosis associated with these toxicologic restraints and behaviors has not been examined before.

"Violent resistant activity, fleeing and resisting a LEA carboxylic were the most physiologically alarming activities from an acidosis standpoint in that order.

"A common lactic acid activity of brief negotiating 2 flights of stairs was physiologically similar to the application of an EEA for 15 seconds.

Results

14 samples were taken at 5 of the 60 jumps (11 of 60 jumps - 18% subject restraint). There was a difference in age, gender, or BMI between the groups.

"Work baseline of p<.001 (range: 2.76 to 7.26) with no difference between the groups (p=.321).

"Work post exposure for group 1 was 7.71 (range: 6.99 to 7.76) with no difference between the groups (p=.321).

"Work post exposure for group 2 was 7.19 (range: 5.91 to 7.76) with no difference between the groups (p=.321).

"Work post exposure for group 3 was 7.07 (range: 6.96 to 7.26) with no difference between the groups (p=.321).

"Work post exposure for group 4 was 6.88 (range: 5.71 to 7.35) with no difference between the groups (p=.321).

"Work post exposure for group 5 was 7.35 (range: 6.96 to 7.76) with no difference between the groups (p=.321).

"Work post exposure for group 6 was 7.09 (range: 6.01 to 7.35) with no difference between the groups (p=.321).

"These significant differences (p<.001) persisted over the subsequent 5 measured time points.

"Work baseline lactate was 4.59 (range: 4.01 to 4.32) with no difference between the groups (p=.197).

"Work post exposure lactate for group 1 was 13.71 (range: 9.04 to 17.75) with no difference between the groups (p=.197).

"Work post exposure lactate for group 2 was 19.04 (range: 17.94 to 20.04) with no difference between the groups (p=.197).

"Work post exposure lactate for group 3 was 4.20 (range: 3.43 to 4.98) with no difference between the groups (p=.197).

"Work post exposure lactate for group 4 was 13.00 (range: 10.30 to 15.00) with no difference between the groups (p=.197).

"Work post exposure lactate for group 5 was 4.82 (range: 4.00 to 5.00) with no difference between the groups (p=.197).

"Work post exposure lactate for group 6 was 5.04 (range 5.00 to 5.00) with no difference between the groups (p=.197).

Conclusions

The maximal groups of heavy bag and sprays had a higher peak and higher lactate after the exposure than the other group.

The exposure of the TSSD and CC spray had higher peak and lower lactate than the other groups.

Additional behaviors of restraint and feeling was the most profound levels of lactate.

"Measured LEA lactate did not induce lactate to the same kind as mental subject behavior.

The cardiac activity of brief periods and down stress causes similar acidosis physiology to a functional CC application.

This work represents the first known study to evaluate acidosis that may be associated with LEA application of force.

Citations