



New Medical Research Disproves the Acidosis Theory of Liability Used in the Heston Case

TASER ECD Does not Cause Dangerous Levels of Acidosis

Background. TASER International periodically provides updates on medical research findings regarding the physiologic effects of electronic control devices (ECDs) on human and animal subjects. This Training Bulletin contains the most recent research findings as of the date of release.

Synopsis

Law enforcement personnel are frequently called upon to deal with individuals in crisis who are physiologically compromised and are at a heightened risk of serious injury or death, regardless of actions taken by law enforcement. In addition, the restraint and arrest process can introduce additional physiologic changes that may worsen a person's baseline physiology. These changes may include significant acidosis, cardiac arrest, or other medical conditions.

Acidosis:

- Recent human medical research determined that muscle contractions from TASER ECD exposures for up to 10 and 15 seconds in rested human subjects resulted in minimal increases in acidosis that did not approach a dangerous level and was clinically not noticed by the test subjects.
- This research also showed that application of a TASER device for up to 15 seconds to an exerted, already acidotic person did not worsen the acidosis that was already present.
- This medical research disproves the “straw that broke the camel’s back theory” of worsening acidosis that theorizes that the physiologic effect from a TASER device discharge on an already acidotic person was an added acidosis “straw” that contributed to death from acidosis. This was essentially the theory of liability used in the *Betty Lou Heston, et al. v. City of Salinas, et al.* (CA) lawsuit. This new research reveals the flaws in this jury verdict since application of a TASER device for up to 15 seconds to an exerted, already acidotic person did not worsen the acidosis that was already present.
- In comparing volitional actions by the individual, the top two worst things that a criminal suspect could do with regard to acidosis are resist and flee – in that order. These two volitional actions produce profound metabolic acidosis that can make the suspect very ill (in addition to any other volitional behaviors that they may have undertaken such as abuse of illicit drugs or consuming a significant amount of alcohol). When compared with a TASER device application, this research data indicates that a continued, prolonged resistive struggle or a foot chase is more dangerous.
- The TASER device, with a good probe spread may represent the best option that will allow quick restraint and EMS care.

Cardiac:

- Human research has shown that the immediate induction of ventricular fibrillation, an arrhythmia that can be fatal without intervention, by the direct electrical effects of the TASER X26 on the normal adult heart is unlikely and that the induction of delayed cardiac arrest by this mechanism is extremely unlikely.
- Researchers have concluded that the a close distance between the ECD dart and the heart is the primary factor in determining whether an ECD will affect the heart. This risk is judged to be extremely low in field use.

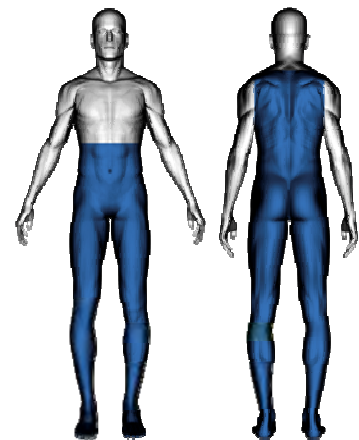


- The risk of an adverse cardiac event related to a TASER ECD discharge is deemed to be extremely low. However, it is not possible to predict nor test against the entire spectrum of potential human physiologies or conditions such as unpredictable combinations of drugs of unknown concentration or origin in the presence of underlying cardiac or other disease. Furthermore, a law enforcement officer will have no means to diagnose these factors in any event.
- Sudden Cardiac Arrest (SCA) is a leading cause of death in the United States, claiming an estimated 325,000 lives each year. These deaths occur on golf courses, in airports, during physical exertions, from startle or other stimuli, or just about anywhere. Should Sudden Cardiac Arrest occur in a scenario involving a TASER discharge to the chest area – it would place the law enforcement agency, the officer, and TASER International in the difficult situation of trying to ascertain what role, if any, the TASER ECD could have played in a unique situation that cannot be replicated in human clinical safety evaluations. In order to reduce the risk of such an event, and in light of the fact that frontal applications of TASER ECDs have been found to be more effective when the probes are targeted at the lower torso (engaging the balancing muscles of the pelvic triangle) we have lowered the recommended point of aim from the center of mass to the lower center of mass for frontal discharges. We believe this recommendation will improve the effective use of TASER ECDs while also further increasing safety margins and enhancing the ability to defend such cases in post event legal proceedings.

Overview and Training Implications

1. **We have issued a new TASER Targeting Guide that will apply for the new XREP impact munition as well as ECDs such as the X26, M26 and X3.** Note, we have lowered the recommended point of aim from center of mass to lower-center of mass for front shots. The blue highlighted area in the adjacent target man represents the preferred target area. There are three reasons:
 - a. Simplify targeting for all TASER systems to one easy to remember map, avoiding chest shots when possible and the risk of a head/eye shot in a dynamic situation, as is standard for impact munitions
 - b. When possible, avoiding chest shots with ECDs avoids the controversy about whether ECDs do or do not affect the human heart.
 - c. Close-spread ECD discharges to the front of the body are more effective when at least one probe is in the major muscles of the pelvic triangle or thigh region.

in Blue



Back shots remain the preferred area when practical.

2. **When dealing with exhausted individuals or persons exhibiting symptoms of distress or agitated/excited delirium:**
 - a. **Once officers engage in capture procedures, it is important to minimize the duration of the physical struggle.** New research shows that physical struggle, simulated by punching a heavy bag at full intensity, can cause acidosis that can reach dangerous levels in only 45 seconds of intense exertion, starting from a resting state. Accordingly, officers engaging subjects in a physical struggle or in an exhaustive state should develop a plan to capture and

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restrain the subject as expeditiously as possible to minimize the duration of struggle and the adverse physiological effects. The physiologic effects of a TASER ECD discharge of up to 15 seconds was significantly less than that of either fleeing (simulated with a sprint) or fighting (simulated with the heavy bag). This research shows that the TASER ECD, as part of an overall capture plan, is a viable option to help minimize the duration of the struggle.

- b. When encountering subjects exhibiting symptoms of exhaustion, distress or agitated/excited delirium, refer to your agency's guidelines for proper response.** These subjects are at significant risk of arrest-related death. Immediate medical attention may reduce this risk.
- 3. The primary risk of serious injury or death during ECD deployment is risk related to falls. Users should be reminded to avoid deploying ECDs on persons on elevated platforms or other places where a fall can be more injurious.**

This bulletin should be distributed to all ECD-certified officers.



Medical Research Update Details

Recent human medical research continues to affirm the general safety of TASER® electronic control devices (ECDs or devices).¹ In 2008 alone, over 30 new medical studies were published in paper, abstract, or poster form on TASER technology. Some of these studies presented ground breaking research in the areas of human physiological changes and cardiac safety. In addition, several new ECD field-use epidemiological studies were published.² Dr. James Jauchem published a new article on deaths in custody³ focusing on excited delirium and ECDs.⁴ Two new books were published, one solely dedicated to ECDs⁵ and one with a significant chapter on ECDs.⁶ Some of these studies provided substantial evidence confirming generally held beliefs regarding the effects of law enforcement force and restraint in the areas of human physiological changes and cardiac safety.

Physiologic Changes⁷

Law enforcement personnel are frequently called upon to deal with individuals in crisis who are physiologically compromised⁸ and are at a heightened risk of serious injury or death. The restraint and arrest process can introduce additional physiologic changes that may worsen a person's baseline physiology. These changes may include significant acidosis, cardiac arrest, or other medical conditions⁹. Recent US Bureau of Justice Statistics showed 2,002 US arrest-related deaths for the period 2003-2005; 55% of which were homicides, 13% involved drugs or alcohol, and 0.1% involved use of a baton or TASER device.

A. Acidosis

Acidosis refers to a condition of decreasing pH (usually measured in blood plasma). Although numerous conditions can cause acidosis, law enforcement personnel commonly confront individuals who are susceptible to developing acidosis because of the individual's behaviors that may include: illicit or prescription drug use, intoxication, agitation, delirium, physical exertion, fighting, resisting arrest and restraint, or fleeing from officers. Many of these behaviors occur in combination and may be additive.

Acidosis is a condition that occurs across a spectrum. While both a pH of 7.35 and 6.20 indicate an acidotic state; these 2 pH levels are clinically very different. The lower value of 6.20 is likely to be lethal and the upper value of 7.35 would likely not even be physically noticeable to an individual. An individual can be acidotic (by definition) but NOT be in any danger physiologically. For instance, briskly walking up flights of stairs would make most people acidotic, but would not put one in any medical danger.

Recent human medical research investigated the physiologic health risks associated with physical exertion similar to resisting arrest or fleeing from police officers, as well as, those risks associated with certain law enforcement control tools. The three law enforcement control tools tested for their effects on causing acidosis were law enforcement canine for capture and restraint, oleoresin capsicum (OC) spray exposure to the face and neck, and TASER ECD exposure for 10 and 15 seconds to the torso. The researchers measured acidosis changes associated with the above physical exertion and police tools and found the following:

- Muscle contractions from TASER device exposures for up to 10 and 15 seconds in **rested** human subjects resulted in minimal increases in acidosis that did not approach a dangerous level and was clinically not noticed by the test subjects.
- Physical activity similar to fighting and resisting or fleeing from law enforcement produced the worst and most clinically significant acidosis. This volitional activity was clearly the most potentially harmful from a physiologic standpoint and the test subjects clinically felt ill following this activity.
- Canine takedown and restraint had the highest increase of acidosis levels of the **law enforcement tools tested**.
- OC spray had the least increase in acidosis levels of the **law enforcement tools tested**. This was expected since TASER device application stimulates muscles and OC spray does not. The researchers opined that since OC spray does not usually incapacitate a focused person or a person intoxicated on drugs or alcohol, **the fight or flight is likely to continue and may result in**

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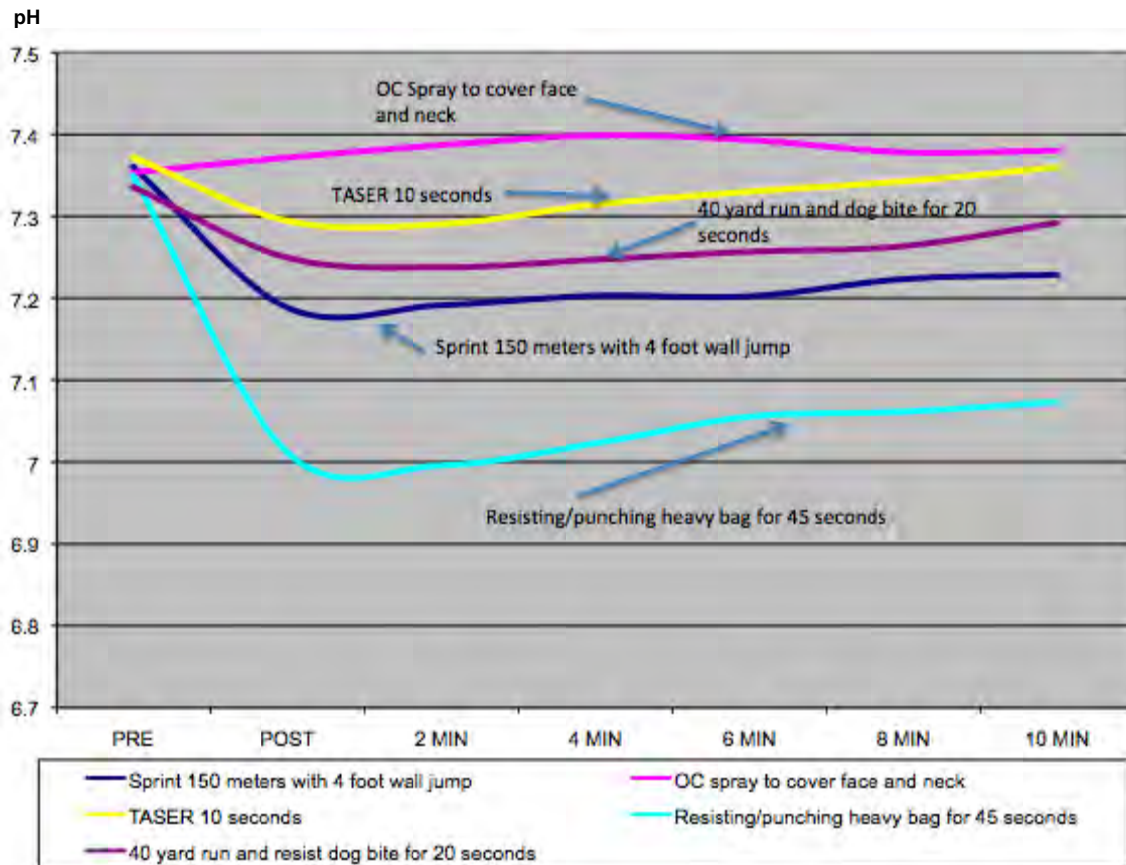
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worsening acidosis. It is likely that OC spray, while not directly causing acidosis, could indirectly make it worse.

Following is a pH graph that depicts these results. The least amount of decrease in pH is the safest.



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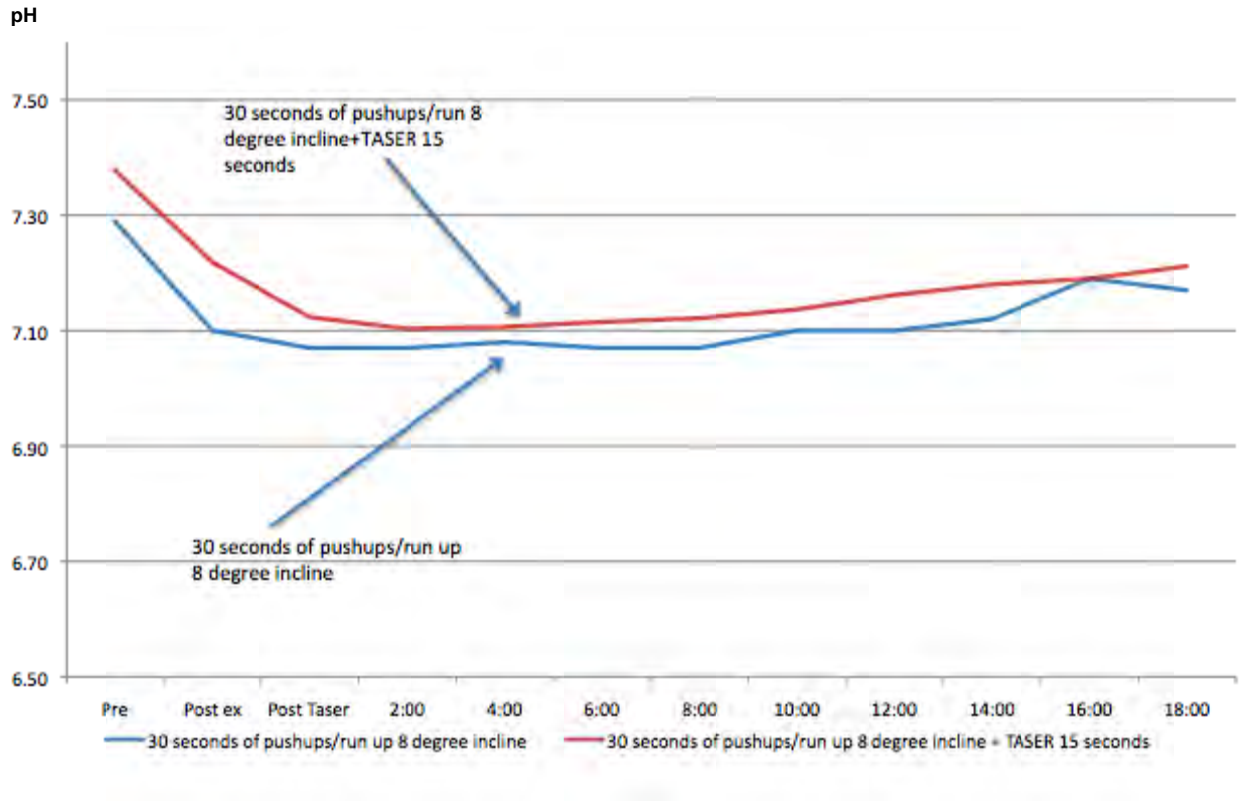
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- Recent human medical research also investigated the physiologic health risks associated with a TASER discharge on an already acidotic person. **This research showed that application of a TASER device for up to 15 seconds to an exerted, already acidotic person did not worsen the acidosis that was already present.** The following graph depicts these test results:



- This medical research disproves the “straw that broke the camel’s back theory” of worsening acidosis that theorizes that the physiologic effect from a TASER device discharge was an added acidosis “straw” that contributed to death from acidosis. This was essentially the theory of liability used in the *Betty Lou Heston, et al. v. City of Salinas, et al.* (CA) lawsuit which resulted in a jury finding that the TASER device contributed 15% to Heston’s death while his own actions, which included methamphetamine intoxication, prolonged physical exertion and resisting arrest; contributed 85% to his death. This new research reveals the flaws in this jury verdict since application of a TASER device for up to 15 seconds to an exerted, already acidotic person did not worsen the acidosis that was already present.

In comparing volitional actions by the individual, the top two worst things that a criminal suspect could do with regard to acidosis are resist and flee – in that order. These two volitional actions produce profound metabolic acidosis that can make the suspect very ill (in addition to any other volitional behaviors that they may have undertaken such as abuse of illicit drugs or consuming a significant amount of alcohol). When compared with a TASER device application, this research data indicates that a continued, prolonged resistive struggle or a foot chase is more dangerous. It appears that it is these physical actions of resisting and fleeing that will most worsen acidosis. While the scientific studies were able to demonstrate this profound effect on acidosis with only 45 seconds of exertion, many arrest-related struggles last much longer.

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Based on the research data referenced above, by the time the officers arrive, many suspects are already significantly acidotic from their own volitional actions – likely with lower pH levels resulting in an increased chance of injury, worsening condition, or possibly death, independent of any other action taken by the police officers. Potential danger exists in allowing the suspect to continue with agitated or resistive behavior. Prolonging restraint by allowing a fight or a fleeing situation may only serve to worsen the suspect's condition. The TASER device, with a good probe spread may represent a tool that will allow quick restraint and EMS care.

Human medical tests have, for the most part, been limited to 15-second ECD applications. Recent animal research tested the physiological effects of ECD exposures up to 30 minutes on anesthetized swine and concluded that “The dose does not seem to be cumulative. We did not observe an accumulation of the TASER® [ECD] effect to a ‘toxic’ level. There was no increased mortality with longer durations of TASER [ECD] exposure”.¹⁰

Please see “Attachment A” for a summary of related human medical research.

B. Cardiac

The conclusions of recently published human medical cardiac studies are summarized as follows:

- In summary, this review of the scientific literature suggests that the immediate induction of ventricular fibrillation by the direct electrical effects of the TASER X26 on the normal adult heart is unlikely and that the induction of delayed cardiac arrest by this mechanism is extremely unlikely.¹¹
- Although heart rate increased in some cases, there were no cardiac dysrhythmias, or interval morphology changes in human subjects who received a TASER discharge based on a 12-lead ECG performed immediately before and within 1 minute after a TASER device activation.¹² The cardiac changes were also evaluated in acidotic, exhausted humans and the same conclusion was reached.¹³
- Prolonged 15-second ECD application in a physically exhausted adult human did not cause a detectable change in their 12-lead ECGs. Theories of CEW-induced dysrhythmias are not supported.¹⁴
- A 10-second ECD exposure in an ideal cardiac axis application did not demonstrate concerning tachyarrhythmias using human models. The swine model may have limitations when evaluating ECD technology.¹⁵
- In a resting adult population, the ECD did not affect the recordable cardiac electrical activity within a 24-hour period following a standard 5-second application. The authors were unable to detect any induced electrical dysrhythmias or significant direct cardiac cellular damage that may be related to sudden and unexpected death proximal to ECD exposure. Additionally, no evidence of dangerous hyperkalemia or induced acidosis was found. The authors recommended further study in the area of the in-custody death phenomenon to better understand its causes.¹⁶
- Human volunteers exposed to a single shock from a ECD did not develop an abnormal serum troponin I level 6 hours after exposure, suggesting that there was no myocardial necrosis or infarction.¹⁷
- CEW [Conducted Energy Weapon or ECD] exposure produced no detectable dysrhythmias and a statistically significant increase in heart rate. Overall, TASER CEW exposure appears to be safe and well tolerated from a cardiovascular standpoint in this population. This study increases the cumulative

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human subject experience of CEW exposure with continuous ECG monitoring and includes 28 full 5-s exposures¹⁸.

- Relatively large variations about the X26 operating level were found not to result in fibrillation or asystole¹⁹.
- CEW exposure produced no detectable dysrhythmias and a statistically significant increase in heart rate. Overall, TASER CEW exposure appears to be safe and well tolerated from a cardiovascular standpoint in this population. This study increases the cumulative human subject experience of CEW exposure with continuous ECG monitoring and includes 28 full 5-s exposures²⁰.

Conclusion regarding the potential for cardiac effects: Researchers have been able to demonstrate changes in heart rate and rhythm consistent with cardiac pacing and, in some cases, ventricular fibrillation (VF) in small swine, an arrhythmia that can be fatal without intervention, and have concluded that the a close distance between the ECD dart and the heart is the primary factor in determining whether an ECD will affect the heart. The threshold for VF has been estimated to be 12.6 times that for cardiac pacing²¹. This risk is judged to be extremely low in field use. In order to increase the safety margin and since field experience shows that ECD discharges are effective when deployed to the large muscles of the back, abdomen, legs and pelvic triangle, users should aim for the back or (when practical) toward the mid lower abdomen and avoid intentionally targeting the chest area with probe applications to increase effectiveness and avoid the remote potential risk of cardiac effect.

Revised Warnings

Attached are the new Product Warnings which have been updated based on this new human medical research. Go to www.TASER.com for the complete Product Warnings document and glossary of terms for Law Enforcement.

Any questions regarding this Training Bulletin should be directed to the TASER International Training Department at (800) 978-2737 or by email to Training@TASER.com.



ATTACHMENT A

Acidosis

- Acidosis is worse from continued exertion when compared to a TASER device application. This does not support an association between TASER device applications and sudden death due to worsening acidosis. It does support a worsening acidosis from continued exertion independent of TASER device application.²²
- The TASER XREP™ projectile is new technology that will be used to control dangerous, agitated or potentially violent persons in the community. It will allow greater law enforcement and suspect safety because of its ability to help control individuals from a greater distance. The initial investigation into the physiologic effect that this device will have on humans with regard to serum biomarkers was done with the unfinished product while under development. Prolonged ECD application with this initial design caused small but statistically insignificant changes in measured serum biomarkers. These small changes would likely result in limited clinical significance. It appears that the tested developmental XREP ECD represents an adequate risk/benefit ratio if used for its intended purpose.²³ Further testing of the final XREP product is now underway.
- There were no clinically significant or lasting statistically significant changes in cardiovascular, electrolyte, lactate or pH levels in human subjects after a 5 second TASER activation.²⁴
- Markers of acidosis and cardiac injury were similar among acidotic subjects who underwent both sham and real prolonged CEW exposure. Prolonged CEW exposure in humans does not appear to have an effect with regard to worsening acidosis that is already present.²⁵
- There were no worrisome changes in measured serum biomarkers. There was a significant decrease in serum lactate after exposure. This data does not support a causal relationship between ECD drive-stun applications and worsening physiology.²⁶
- In this resting adult population, the TASER X26 device did not affect the recordable cardiac electrical activity within a 24-hour period following a standard five-second (s) application. The authors were unable to detect any induced electrical dysrhythmias or significant direct cardiac cellular damage that may be related to sudden and unexpected death proximal to CEW exposure. Additionally, no evidence of dangerous hyperkalemia or induced acidosis was found. Further study in the area of the in-custody death phenomenon to better understand its causes is recommended.²⁷
- Cardio-respiratory and blood parameters were followed before and for 60 min after a 5 s TASER exposure on 21 men and women law enforcement officer volunteers.²⁸
- ...the repeated use of electro-muscular incapacitating devices in a short period of time is, at least, feasible, with the caveat that some medical monitoring of subjects may be required (to observe factors such as lactate and acidosis).²⁹
- Three repeated TASER device exposures had only transient effects on blood factors, which all returned to pre-exposure levels, with the exception of hematocrit (which remained elevated after 3 h). Since the increase in this factor was less than that which may occur after short periods of exercise, it is unlikely that this would be an indicator of any serious harm.³⁰
- Intoxicated adults with prolonged CEW exposure demonstrate small transient increases in measures of acidosis and no change in markers of cardiac injury. The increased acidosis was not clinically significant and self corrected.³¹

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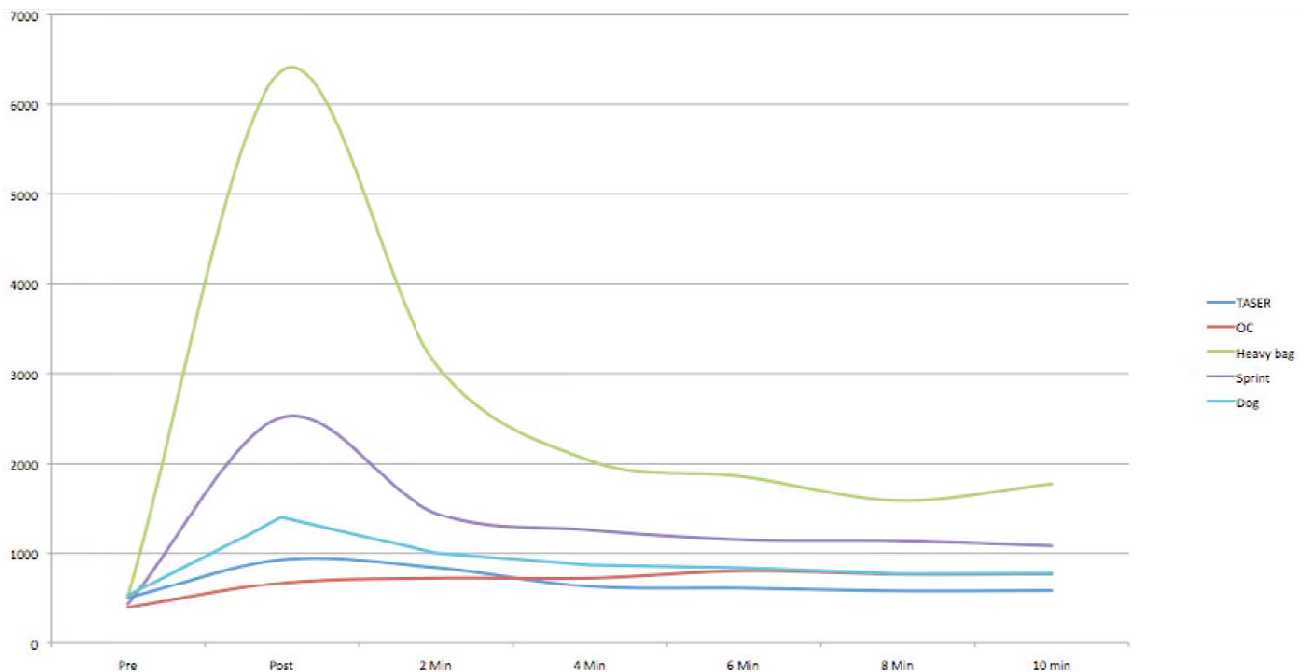
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Stress

- Alpha-amylase had the greatest increase from baseline at 10–15 min with the defensive tactics drill. Cortisol had the greatest increase at 15–20 min with O.C. spray. Cortisol remained most elevated at 40–60 min in the defensive tactics drill group. Our preliminary data suggests that physical exertion during custodial arrest may be most activating of the human stress response, particularly the sympathetic-adrenal-medulla axis. This may suggest that techniques to limit the duration of this exertion may be the safest means to apprehend subjects, particularly those at high-risk for in-custody death. Conducted electrical weapons were not more activating of the human stress response than other uses of force.³² Please see the following graph:



- A 5-second exposure of a TASER X26 [device] to healthy law enforcement personnel does not result in clinically significant changes of physiologic stress.³³

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¹ For a complete listing see the most current Electronic Control Device Research Index posted on TASER International, Inc's (TASER) website at www.TASER.com.

² Bozeman WP, Hauda WE, 2nd, Heck JJ, Graham DD, Jr., Martin BP, Winslow JE. Safety and Injury Profile of Conducted Electrical Weapons Used by Law Enforcement Officers Against Criminal Suspects. *Ann Emerg Med*. Jan 21 2009.

³ For more information on excited delirium and custody related death issues see the Custody Related Death Research Index posted on TASER's website at www.TASER.com, and www.incustodydeath.com.

⁴ Jauchem, PhD, James R., Deaths in custody: Are some due to electronic control devices (including TASER® devices) or excited delirium? *Journal of Forensic and Legal Medicine*, doi:10.1016/j.jflm.2008.05.011.

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- ⁵ Mark W. Kroll (Editor), Jeffrey D. Ho (Editor). TASER® Electronic Control Devices: Physiology, Pathology, and Law. Springer.
- ⁶ Edited by Raymond M. Fish and Leslie A. Geddes, Lawyers & Judges Publishing Company, Inc. Electrical Injuries: Medical and Bioengineering Aspects, Second Edition, Chapter 42: TASER Electronic Control Devices.
- ⁷ “Physiologic changes” include, but are not limited to, changes in: heart rate; heart rhythm; stress hormones or other biochemical neuromodulators (e.g., catecholamines); respiration; adrenergic states; tissue temperature; myoglobin; potassium; creatine kinase; lactic acid, or pH.
- ⁸ “Physiologically compromised” include those persons whose lives in rare circumstances may be at risk of arrest-related death due to excited or agitated delirium, acidosis, cardiac arrest, serotonin syndrome, neuroleptic malignant syndrome, sudden unexpected death in epilepsy, catecholamine release or buildup, compromised cardiac or pulmonary conditions, sickle cell compromise, and drug or alcohol use or withdrawal.
- ⁹ Such as hyperkalemia, rhabdomyolysis, apnea, increased adrenergic states, or hypercarbia.
- ¹⁰ Hughes E, Kennett M, Murray W, Werner J, Jenkins D. *Electro-Muscular Disruption (EMD) bioeffects: A study of the Effects of Continuous Application of the TASER X26 Waveform on Swine*: Penn State University Institute for Non-Lethal Defense Technologies; Nov 30 2007.
- ¹¹ Raymond Ideker, MD, PhD and Derek J. Dossdall, PhD; Can the Direct Cardiac Effects of the Electric Pulses Generated by the TASER X26 Cause Immediate or Delayed Sudden Cardiac Arrest in Normal Adults? *The American Journal of Forensic Medicine and Pathology*, Vol 28, No. 3, September 2007.
- ¹² Vilke GM, Sloane C, Levine S, Neuman T, Castillo E, Chan TC. Twelve-lead electrocardiogram monitoring of subjects before and after voluntary exposure to the TASER X26. *Am J Emerg Med*. Jan 2008;26(1):1-4.
- ¹³ Ho JD, Dawes DM, Heegaard WG, Calkins HG, Moscatti RM and JR Miner. Absence of Electrocardiographic Change Following Prolonged Application of a Conducted Electrical Weapon on Physically Exhausted Adults. *J Emerg Med*, 2009;In Press.
- ¹⁴ Ho J, Dawes D, Calkins H, Johnson M. Absence of Electrocardiographic Change Following Prolonged Application of a Conducted Electrical Weapon in Physically Exhausted Adults. *Acad Emerg Med* 2007;14(5):128-129.
- ¹⁵ Ho JD, Dawes DM, Reardon RF, et al. Echocardiographic Evaluation of a TASER-X26 Application in the Ideal Human Cardiac Axis. *Acad Emerg Med*. Aug 10 2008.
- ¹⁶ Ho JD, Miner JR, Lakireddy DR, Bultman LL, Heegaard WG. Cardiovascular and physiologic effects of conducted electrical weapon discharge in resting adults. *Acad Emerg Med*. Jun 2006;13(6):589-595.
- ¹⁷ Sloane CM, Chan TC, Levine SD, Dunford JV, Neuman T, Vilke GM. Serum troponin measurement of subjects exposed to the TASER X-26. *J Emerg Med*. Jul 2008;35(1):29-32.
- ¹⁸ Bozeman study Immediate cardiovascular effects of the TASER X26 conducted electrical weapon, W P Bozeman, D G Barnes, Jr, J E Winslow, III, J C Johnson, III, C H Phillips, and R Alson, *Emerg. Med. J.* 2009; 26(8): p. 567-570; <http://emj.bmj.com/cgi/content/abstract/26/8/567?ct=ct>.
- ¹⁹ Beason CW, Jauchem JR, Clark CD, 3rd, Parker JE, Fines DA. Pulse variations of a conducted energy weapon (similar to the TASER X26 device): effects on muscle contraction and threshold for ventricular fibrillation. *J Forensic Sci*. Sep 2009;54(5):1113-1118.
- ²⁰ Bozeman WP, Barnes DG Jr, Winslow JE III, Johnson JC III, Phillips CH, Alson R. “Immediate cardiovascular effects of the TASER X26 conducted electrical weapon,” *Emerg. Med. J.* 2009, 26; 567-570.

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- ²¹ Raymond Ideker, MD, PhD and Derek J. Dossdall, PhD; Can the Direct Cardiac Effects of the Electric Pulses Generated by the TASER X26 Cause Immediate or Delayed Sudden Cardiac Arrest in Normal Adults? *The American Journal of Forensic Medicine and Pathology*, Vol 28, No. 3, September 2007.
- ²² Ho, J.D., et al., Can Prolonged TASER X26 Exposure or Continued Exertion Contribute to Sudden Cardiac Death Through Worsening Acidosis? 2009, CardioRhythm, Hong Kong: Dept. of Emergency Medicine, Hennepin County Medical Center, Minneapolis, MN Dept. of Emergency Medicine, Lompoc Valley Medical Center, Lompoc, CA.
- ²³ Serum Biomarker Effects of Prolonged TASER XREP Device Exposure, Jeffrey D. Ho, MD, Donald M. Dawes, James R. Miner, MD,, NAME (National Association of Medical Examiners) 2008 Annual Conference (Louisville, Kentucky); European Society of Emergency Medicine Scientific Assembly, Munich Germany Sept 2008.
- ²⁴ Vilke G, Sloane C, Bouton K, et al. Cardiovascular and Metabolic Effects of the TASER on Human Subjects. *Acad Emerg Med* 2007;14(5):104-105.
- ²⁵ Ho J, Dawes D, Bultman L, et al. Physiologic Effects of Prolonged Conducted Electrical Weapon Discharge on Acidotic Adults. *Acad Emerg Med* 2007;14(5):63.
- ²⁶ Ho JD, Dawes DM, Lapine AL, et al. PROLONGED TASER® "DRIVE-STUN" EXPOSURE IN HUMANS DOES NOT CAUSE WORRISOME BIOMARKER CHANGES Hennepin County Medical Center: National Association of EMS Physicians; 2008.
- ²⁷ Ho JD, Miner JR, Lakireddy DR, Bultman LL, Heegaard WG. Cardiovascular and physiologic effects of conducted electrical weapon discharge in resting adults. *Acad Emerg Med*. Jun 2006;13(6):589-595.
- ²⁸ Bouton K, Vilke G, Chan T, et al. Physiological Effects of a Five Second TASER Exposure. San Diego State University San Diego Heart Institute: Society for Academic Emergency Medicine; 2007.
- ²⁹ Jauchem JR, Sherry CJ, Fines DA, Cook MC. Acidosis, lactate, electrolytes, muscle enzymes, and other factors in the blood of *Sus scrofa* following repeated TASER exposures. *Forensic Sci Int*. Aug 10 2006;161(1):20-30.
- ³⁰ Jauchem JR, Cook MC, Beason CW. Blood factors of *Sus scrofa* following a series of three TASER® electronic control device exposures. *Forensic Sci Int*. Jul 12 2007.
- ³¹ Moscati R, Ho J, Dawes D, et al. Physiologic Effects of Prolonged Conducted Electrical Weapon Discharge on Intoxicated Adults. *Acad Emerg Med* 2007;14(5):63-64.
- ³² Dawes D, Ho J, Miner J. The neuroendocrine effects of the TASER X26: a brief report. *Forensic Sci Int*. Jan 10 2009;183(1-3):14-19.
- ³³ Vilke GM, Sloane CM, Bouton KD, et al. Physiological Effects of a Conducted Electrical Weapon on Human Subjects. *Ann Emerg Med*. Aug 23 2007.



IMPORTANT ECD PRODUCT SAFETY AND HEALTH INFORMATION

WARNING

These safety warnings are for your protection as well as the safety of others. Disregarding this information could result in death or serious injury.¹

Complete Training First. Significant differences exist between each of the TASER International, Inc. (“TASER”) Electronic Control Device (“ECD”) models. Do not Use² or attempt to Use any ECD model unless you have been trained and certified by a Certified TASER Instructor³ on that particular model.

Read and Obey. Read, study, understand, and follow all instructions, warnings, information, training bulletins and TASER training materials⁴ before Using the ADVANCED TASER® M26™ ECD, TASER X3™ ECD, or TASER X26™ ECD. Failure to comply with these instructions, warnings, information, training bulletins, and TASER training materials could result in death or serious injury to the User, force recipient, and others.

Obey Applicable Laws. Use the ECD only in accordance with applicable federal, state, local laws and other regulations or legal requirements. Your law enforcement agency’s Guidance⁵ must also be followed.⁶ Any Use of an ECD must be legally justifiable. Resistance to law enforcement interaction incurs substantial risk of death or serious injury and subjects who resist law enforcement assume all such risks of death or serious injury.



This warning label appears on newer ECD models.

These warnings are effective September 30, 2009, and supersede all prior revisions and relevant Training Bulletins. The most current warnings are online at www.TASER.com.

SCOPE AND PURPOSE

This document presents important safety warnings, instructions, and information intended to reasonably minimize hazards associated with ECD deployment, intended Use, side effects, and environment of Use.

Confronting, apprehending, capturing, controlling, restraining, incapacitating, and taking persons into custody are high risk events that could result in death or serious injury.

¹ These warnings are state of the art but cannot address all possible ECD application circumstances or permutations. They are intended to inform Users about reasonably foreseeable potential risks of harm. The decision to Use the ECD in a particular manner or circumstance must follow applicable legal standards. These warnings do not create a standard of care. Herein, the singular is also the plural, the plural includes the singular, and the masculine is also the feminine.

² The terms “Use,” “Used,” “Using,” or “User” include, but are not limited to: acquiring; accessing; entrusting; providing; possessing; storing; handling; manipulating; carrying; holstering; drawing; brandishing; displaying; deploying; utilizing; drive-stunning; using alligator or other types of clips or attachments; or discharging an ECD.

³ A Certified TASER Instructor possesses and maintains a current TASER instructor certification for the specific product model they are teaching, demonstrating, or Using and is required to be fully compliant with TASER’s most current training requirements and materials.

⁴ Current TASER Instructor Training materials may be obtained by contacting TASER’s Training Department.


⁵ Law enforcement agencies are force and force tools experts and are solely responsible for their own Guidance. “Guidance” includes, but is not limited to, policy, procedure, rule, order, directive, training, continuum, and standard. TASER has no power or authority to mandate or require Guidance, set policy, or establish standards of care or conduct.


⁶ Law enforcement agencies, government entities, and Users are sophisticated purchasers, sophisticated users, and learned intermediaries with respect to law enforcement weapons (including ECDs), force, force use, legality of force use, and reporting.



When lawfully Used as directed, ECDs are designed in probe-deployment mode to temporarily incapacitate a person from a safer distance than some other force options, while reducing the likelihood of death or serious injury. Any use of force, physical exertion, capture, control, restraint, or incapacitation involves risks that a person may get hurt or die.⁷

Within this document certain safety signals and signal words are used to call attention to safety messages:

 The safety alert symbol is used to alert Users to potential injury hazards. ALWAYS Obey all safety messages that follow this symbol to reasonably minimize the risk of death or serious injury when the ECD is Used and to enhance safe operation of the ECD.

 **WARNING** The signal word WARNING indicates a hazardous situation which, if not avoided or heeded, could result in death or serious injury. It is intended to direct the User's attention to hazards that may not be obvious, but may be reasonably mitigated by heeding training and instructions, or avoiding certain actions, circumstances, or behaviors, thereby improving the safety of the ECD. WARNINGS may be followed by instructions and information integral to the WARNING.

SAFETY INFORMATION: GENERAL PRECAUTIONS

WARNING

Unintentional Deployment Hazard. Unintentional ECD activation could result in death or serious injury to the User, force recipient, and others. Follow and comply with the following instructions to reduce the risk of unintentional Use, deployment, or activation.

Store in a Secure Location. Store ECDs, cartridges, and accessories in secure locations inaccessible to children and other unauthorized persons to prevent inappropriate Use, which may result in death or serious injury to the User, other persons, or animals. ECDs, cartridges, and accessories are not toys.

Use of ECD Safety. Always place the ECD safety switch in the down (SAFE) position when not in Use. Remember to place the ECD safety switch in the up (ARMED) position when you intend to Use the ECD.

Assume ECD is Loaded. Always assume that an ECD is loaded and capable of discharging. To avoid unexpected discharge, ensure that no live cartridge is in the ECD when inserting: a battery; CDPM™, DPM™, EPM™, TPM™, or XDPM™ battery pack; TASER CAM™ recorder; or while performing spark tests (except when spark testing the X3 ECD), maintenance, data downloading, or battery charging.

Be Aware of ECD Deployment Mode. Keep your finger off the trigger until it is legally justifiable to use the ECD. Be aware of the deployment mode (manual or semi-automatic) set on the X3 ECD before discharging that ECD.

Keep Body Parts away from Front of ECD or Cartridge. Keep your hands and body parts away from the front of the ECD and cartridge, unless instructed otherwise. A discharging ECD or cartridge could result in serious injury.

Avoid Static Electricity. Keep the cartridge away from sources of static electricity. Static electricity can cause the ECD or X26 or M26 cartridge to discharge unexpectedly, which could result in serious injury.

Beware of Electronic Equipment Interference. Interference from electronic transmission equipment in close proximity to the ECD could interfere with the proper operation of the ECD and cause the ECD to discharge. Keep the ECD at least several inches away from other electronic equipment. Place the ECD safety switch in the down (SAFE) position whenever it is immediately adjacent to electronic equipment (including transmitting radios and cell phones). Remember to place the ECD safety switch in the up (ARMED) position prior to attempting Use.

⁷ "Almost every use of force, however minute, poses some risk of death." *Garrett v. Athens-Clarke County*, 378 F.3d 1274, 1280, n.12 (11th Cir. 2004).



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Avoid Dropping ECD or Cartridge. If an ECD or cartridge is dropped or damaged it may unintentionally deploy or discharge, become inoperable, or fail to function, making it unsafe for continued use. If an ECD or cartridge has been dropped or damaged, refer to the procedure recommended in the current version of the TASER Instructor Training materials.

WARNING

Failure to maintain an ECD as instructed may cause the ECD to malfunction or fail to function optimally and could result in death or serious injury. Follow and comply with the following instructions to reduce the risk of ECD malfunction, including failure.

Damaged ECD or Cartridge. Do not use a cartridge with a missing blast door unless facing an immediate threat. ECD repair or modification by an unauthorized person may cause the ECD to fire or malfunction, will void the warranty, and may put the User or other person at risk of death or serious injury.

Update ECD Software. Some ECDs, including the TASER X26 and X3, have the capability for software updating. It is important to acquire, update, and maintain the latest ECD software update. Current ECD software may be obtained by contacting TASER's Customer Service Department or following instructions at the EVIDENCE.COM™ site.

Use Only TASER-Approved Components, Batteries, Accessories, and Cartridges. The ECD is a sophisticated electronic system. In order to provide proper function, only TASER-approved components, batteries, accessories, and cartridges are to be used with the ECD. Use of anything other than TASER-approved components, batteries, accessories, and cartridges will void the warranty, may cause malfunction, and may put the User or other person at risk of death or serious injury.

Avoid Exposure to Wet Conditions. If the ECD is drenched or immersed in water or other liquid, DO NOT Use the ECD until completing the procedure recommended in the current version of the TASER Instructor Training materials.

SAFETY INFORMATION: ECD DEPLOYMENT AND USE

WARNING

Perform Spark Test Prior to Each Shift. ECDs must be safely spark tested prior to each shift.

WARNING

Avoid Misuse. Use an ECD only for its intended purpose, in legally justifiable situations, and in accordance with User's agency's Guidance.

WARNING

Never Confuse Handgun with ECD. Confusing a handgun with an ECD could result in death or serious injury. **ALWAYS** follow your agency's equipment carrying and holstering location Guidance and training regarding distinguishing between handguns, other weapons, and ECDs.

WARNING

Be Aware that an ECD or Cartridge may Fail to Fire, Operate, or be Effective. No weapons system, tool, technique, or ECD is always effective. If an ECD, cartridge, or accessory is inoperable, fails to function, or the intended ECD application is ineffective in achieving the desired effect, consider reloading and redeploying, using other force options, disengaging, or using other alternatives according to agency Guidance. The failure of the ECD to fire, operate, or be effective could result in death or serious injury.

Prepare to Redeploy ECD or Use Backup Plan. Always prepare to redeploy the ECD or Use a backup plan. Be familiar with backup plans and acceptable alternatives in the event of ineffective deployment.

**WARNING**

Probe or Electrode Injury or Infection Hazard. ECD Use may cause a mark, burn, scar, penetration, other skin, or tissue damage or infection. Provide First Aid and medical care as needed.

Scarring. Use of an ECD may cause irritation, puncture, mark, abrasion, rash, burn, keloid, or other scarring that may be permanent. This risk may be increased when using the M26 or X26 in drive-stun mode with the cartridge removed or the X3 ECD in drive-stun mode due to the multiple sets of electrical contacts. The nature and severity of these effects depends on the area of exposure and method of application, individual susceptibility, and other circumstances surrounding ECD Use, exposure, and after care.

Penetration Injury. The TASER probe has a small dart point which may cause a penetration injury to blood vessel, or internal organ (including lung, bone, or nerve). The probe or dart point (which may detach) can also puncture or become embedded into a bone, organ, or tissue, which may require immediate medical attention, surgical removal, or may result in scarring, infection, or other serious injury.

Penetration Injury Care. Injury due to penetration of the probe or dart point into a blood vessel, organ, nerve, or bone may require medical attention. A probe, dart point, or barb embedded in a sensitive area such as the eye, the genital area, breast, neck, throat, or vascular structure may cause serious injury and may require special medical attention and further evaluation.

Probe Removal. Probe removal may cause injury. Leaving a probe in the body may result in pain or injury. Follow your agency's Guidance and biohazard protocols for probe removal. In the case of embedment, organ or bone penetration, or probe, dart point, or barb detachment, immediate medical attention and possible surgical removal may be required.

Skin, Wound, or Infection Treatment. ECD Use may cause a skin irritation, puncture wound, abrasion, mark, rash, burn, keloid or other scar which may require medical attention and may be permanent. As with any injury of this type, infection or tetanus may occur in some circumstances.

Biohazards. Utilize appropriate biohazard protocols and personal protective equipment including Body Substance Isolation procedures, gloves, masks, and washing of hands and exposed areas as necessary. Follow your agency's Guidance and appropriate biohazard, waste, and evidence protocols when dealing with biohazards.

Untethered Discharged Probe. In probe deployment, it is possible that a discharged probe that does not impact a subject or target may become untethered from the wire and travel a significant distance. A loose, untethered probe can cause serious injury.

WARNING

Eye Injury Hazard. If a TASER probe, electrode or electrical discharge contacts or comes into close proximity to an eye it could result in serious injury, including permanent vision loss. DO NOT intentionally aim an ECD at the eye of a person or animal without justification.



LASER light could result in serious eye injury. The ECD uses a LASER as a targeting aid. Avoid intentionally aiming the LASER at the eye of a person or animal without justification. NEVER aim the LASER at aircraft.

WARNING

Sensitive Body Part Hazard. When possible, avoid intentionally targeting the ECD on sensitive areas of the body such as the head, throat, chest/breast, or known pre-existing injury areas without legal justification. The preferred target areas are the lower center mass (below chest) for front shots and below the neck area for back shots.

**WARNING**

Minimize Repeated, Continuous, or Simultaneous⁸ Exposures. Reasonable efforts should be made to minimize the number of ECD exposures. ECD Users should use the lowest number of ECD exposures that are objectively reasonable to accomplish lawful objectives and should reassess the subject's resistance level before initiating or continuing the exposure.

Control and Restrain Immediately. Begin control and restraint procedures, including restraining the subject during ECD exposure, as soon as reasonably safe and practical to do so in order to minimize total ECD exposure. The ECD User, and those individuals assisting the User, should avoid touching the probes, wires, and the area between the probes to avoid accidental or unintended shock during ECD electrical discharge.

WARNING

Incapacitation, Falling, and Startle Hazard. ECD Use may cause muscular contraction, Neuro Muscular Incapacitation ("NMI"), startling, and falling, which could result in death or serious injury.

NMI and Secondary Injuries. An ECD may cause NMI if probes are within sufficient proximity to complete a circuit, with sufficient spread, and an adequate circuit is completed and maintained rendering the subject temporarily unable to control movement and may cause a fall. Also, ECD use may cause a startle response. This loss of control or startle may increase risk of death or serious injury resulting from loss of balance, fall, change in momentum, drowning, or loss of control of any mode of transportation, conveyance, or machinery. Especially at risk is a person who:

- could fall and suffer impact injury to the head or other sensitive area;
- is on an elevated or unstable surface (e.g., tree, roof, ladder, ledge, balcony, porch, bridge, crane, dock, chair, bunk bed, or stair);
- is less able to catch or protect self in a fall (e.g., restrained, handcuffed, incapacitated, or immobilized);
- could fall on a sharp object (e.g., holding a knife or other edged weapon or sharp object on ground);
- is running, in motion, or moving under momentum;
- is operating or riding in or on any mode of transportation (e.g., vehicle, bus, bicycle, motorcycle, cart, train, or airplane), conveyance (e.g., escalator, moving walkway, elevator, skateboard, skates, or rollerblades), or machinery;
- is located in water, mud, or marsh environment if the ability to move is restricted; or
- is physically infirm, elderly, or pregnant.

WARNING

Fire and Explosion Hazard. ECD Use could result in a fire or explosion when flammable gases, fumes, vapors, liquids, or materials are present.

An ECD can ignite explosive and flammable clothing or materials, liquids, fumes, gases, or vapors (e.g., gasoline, vapor or gas found in sewer lines or methamphetamine labs, butane-type lighters, or flammable hair gels). Do not knowingly Use an ECD in the presence of any explosive or flammable substance without legal justification. Note that some self-defense sprays use a flammable carrier, such as alcohol.

SAFETY INFORMATION: ECD KNOWN AND POTENTIAL SIDE EFFECTS**WARNING**

Always follow and comply with all instructions, warnings, information, and current TASER training materials to reasonably minimize the risks associated with possible Use and side effects listed below.

Muscle Contraction or Strain-Related Injury. ECDs can cause strong or moderate muscle contractions that may result in physical exertion, athletic, or sport-type injury, including, but not limited to, injury such as

⁸ "Simultaneous" means delivery to the body of electrical charge by multiple ECDs or multiple completed circuits at the same time.



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hernia, rupture, dislocation, tear, or other injury to soft tissue, organ, muscle, tendon, ligament, nerve, bone, or joint. Fracture to bone, including compression fracture to vertebrae, may occur. These injuries may be more serious and more likely to occur in people with pre-existing injuries, conditions or special susceptibilities, which include but are not limited to, known or unknown: pregnancy; osteopenia; osteoporosis; spinal injury; or previous muscle, disc, ligament, joint, bone, or tendon damage or surgery. Such injuries may also occur when a person reacts to the ECD deployment or discharge by making a rapid movement.

Neurocardiogenic Response (Fainting). A person may experience an exaggerated response to an ECD exposure, or threatened exposure, which may result in a person fainting or falling with possible secondary injury.

Seizure. Repetitive stimuli (e.g., flashing light or electrical stimuli) can induce seizure in some people. This risk may be increased in a person with seizure history or if electrical stimuli pass through the head area. This may also result in a person falling with a possible secondary injury.

Stress and Pain. The ECD can cause temporary discomfort, pain, stress, panic, or startle which may be injurious to some people. Anticipation of ECD exposure can cause stress, trepidation, panic, startle, or fear, which may also be injurious to some people.

Physiologic or Metabolic Effects. The ECD can produce physiologic or metabolic effects which include, but are not limited to, changes in: acidosis; adrenergic states; blood pressure; calcium, creatine kinase ("CK"); electrolytes (including potassium), heart rate and rhythm; lactic acid; myoglobin; pH; respiration; stress hormones or other biochemical neuromodulators (e.g., catecholamines). Reasonable effort should be made to minimize the number of ECD exposures and resulting physiologic and metabolic effects. In human studies of electrical discharge from a single ECD of up to 15 seconds, these effects on acidosis, CK, electrolytes, stress hormones, and vital signs have been comparable to or less than changes expected from physical exertion similar to struggling, resistance, fighting, fleeing, or from the application of some other force tools or techniques. Adverse physiologic or metabolic effects may increase risk of death or serious injury.

Higher Risk Populations. ECD Use on a pregnant, infirm, elderly, small child, or low body-mass index (BMI) person could increase the risk of death or serious injury. ECD Use has not been scientifically tested on these populations. The ECD should not be Used on members of these populations unless the situation justifies possible higher risk of death or serious injury.

Physiologically or Metabolically Compromised Persons. Law enforcement personnel are called upon to deal with individuals in crises that are often physiologically or metabolically compromised and may be susceptible to arrest-related death ("ARD"). The factors that may increase susceptibility for an ARD have not been fully characterized but may include: a hypersympathetic state, autonomic dysregulation, capture myopathy, hyperthermia, altered electrolytes, severe acidosis, cardiac arrest, drug or alcohol effects (toxic withdrawal, sensitization to arrhythmias, etc), alterations in brain function (agitated or excited delirium), cardiac disease, pulmonary disease, sickle cell disease, and other pathologic conditions. These risks may exist prior to, during, or after law enforcement intervention or ECD Use, and the subject may already be at risk of death or serious injury as a result of pre-existing conditions, individual susceptibility, or other factors. In a physiologically or metabolically compromised person any physiologic or metabolic change may cause or contribute to death or serious injury. Follow your agency's Guidance when dealing with physiologically or metabolically compromised persons.

WARNING

Hazardous Substances. The ECD contains components that contain chemicals known to the State of California and others to cause cancer and birth defects or other reproductive harm. Do not disassemble. Refer to your agency's Guidance for proper handling and disposal.