

Letter by Sheridan Regarding Articles, “TASER Electronic Control Devices Can Cause Cardiac Arrest in Humans” and “TASER Electronic Control Devices and Cardiac Arrests: Coincidental or Causal?”

To the Editor:

Circulation presents a provocative juxtaposition of the polarized opinions of Zipes¹ and Kroll et al² on whether the TASER electronic control device (ECD) can induce ventricular fibrillation by an action of precordially administered TASER discharge. The debate is focused on the 8 cases studied by Zipes.¹ This issue is of some importance, as an understanding of the range of clinical effects of ECDs can, and should, inform the circumstances in which these devices are used and what medical contingencies might be needed in the event that things go wrong.

The question of whether ECDs can induce abnormal cardiac excitation can only be systematically addressed in human controlled studies, isolated from the confounders that can obscure interpretation of suspected cardiac adverse outcomes in field use.

To date, there is only 1 human study that has unequivocally shown that ECD discharge, delivered from an “experimental preproduction” version of the TASER X3, can disrupt heart rhythm.³ Importantly, this is the only published human study in which discharge was administered through a chest-penetrating barb located over the heart. The study demonstrated in a single subject a 240-bpm ventricular capture that persisted for the duration of the ECD discharge. Regrettably, this unanticipated adverse response has not been followed-up in studies investigating the relationship between precordial barb position and the induction of arrhythmias by ECD discharge. This absence of follow-up studies leaves a major knowledge gap in our understanding of the cardiac effects of the TASER X26 and newer devices, such as the TASER X2 and X26P.

Would such studies in healthy human subjects meet with ethical approval? It is possible for ECDs to be modified to generate a single pulse after trigger activation rather than the default 19-Hz, 5-second pulse train.⁴ By applying single pulses through barbs located over the

cardiac silhouette, it should be possible to systematically map barb positions associated (or not associated) with the induction of single ventricular ectopic beats.

If abnormal cardiac excitation from precordial ECD discharge can be demonstrated within the relative safety of controlled experimentation, then it follows that a similar effect could arise in field use where it might conceivably be the precursor of less benign forms of arrhythmia.⁵

Disclosures

Dr Sheridan provides advice on the physiological effects of ECDs to the UK Home Office and to SACMILL (the UK’s independent Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons). Dstl is part of the UK Ministry of Defence.

Robert D. Sheridan, PhD

*Biomedical Sciences Department, Defence Science and Technology Laboratory (Dstl)
Porton Down, Salisbury, Wiltshire, UK*

References

1. Zipes DP. TASER electronic control devices can cause cardiac arrest in humans. *Circulation*. 2014;129:101–111.
2. Kroll MW, Lakkireddy DR, Stone JR, Luceri RM. TASER electronic control devices and cardiac arrests: coincidental or causal? *Circulation*. 2014;129:93–100.
3. Ho JD, Dawes DM, Reardon RF, Strote SR, Kunz SN, Nelson RS, Lundin EJ, Orozco BS, Miner JR. Human cardiovascular effects of a new generation conducted electrical weapon. *Forensic Sci Int*. 2011;204:50–57.
4. Dawes DM, Ho JD, Reardon RF, Miner JR. Echocardiographic evaluation of TASER X26 probe deployment into the chests of human volunteers. *Am J Emerg Med*. 2010;28:49–55.
5. DOMILL Statement on the Medical Implications of Use of the Taser X26 and M26 Less-Lethal Systems on Children and Vulnerable Adults. 2012. <http://data.parliament.uk/DepositedPapers/Files/DEP2012-0729/96605%20Library%20Deposit.pdf>. Accessed February 10, 2014.