

## Letter by Vilke et al Regarding Article, “Sudden Cardiac Arrest and Death Following Application of Shocks From a TASER Electronic Control Device”

To the Editor:

We read with interest the article by Zipes on TASERs<sup>1</sup> that has received lay press coverage, with many news headlines and internet blogs reporting, perhaps erroneously, that the study's findings reflect the position of the American Heart Association.

This article describes 8 cases to support an opinion that TASERs can cause cardiac dysrhythmias and sudden death. However, we disagree with this conclusion, because there are a number of details of the cases that require further discussion.

The Methods section states all subjects “were previously clinically healthy males;” however, criteria for “clinically healthy” were not defined. In fact, the table shows that all but one had a significantly enlarged heart or evidence of actual heart disease. When the reported heart weights were compared with the Mayo Clinic nomogram compiled by Kitzman et al,<sup>2</sup> it was evident that all but patient No. 3 had mean heart weights greater than the predicted mean. Subject No. 2, who was 17 years of age and weighed 80 kg, had a heart weight of 410 g (versus 327 g, or 120% of predicted) in addition to focal atherosclerosis evident at autopsy. Subject No. 4, who was 24 years of age and who also weighed 80 kg, had a 400-g heart (versus 327 g, or 120% of predicted) and possible myocarditis. The heart of subject No. 5, a 100-kg man, weighed 470 g (versus 336 g, or 129% of predicted, whereas subject No. 8, a 79-kg man, had a 400 g heart (versus 325 g or 119% of predicted). As Dr Zipes has previously observed himself, left ventricular hypertrophy is clearly a risk factor for sudden cardiac death.<sup>3</sup>

Because of involvement in litigation related to some of these cases, 2 of the authors of this letter have personally reviewed original copies of the medical examiner reports, medical charts, and other documents in a manner similar to Dr Zipes, and one of us reviewed the cardiac histology. We are aware of additional details for these cases that were omitted, which provide greater context. Subject No. 1 had a history of chronic alcoholism, illicit drug use, and mental illness and had a prolonged QTc documented on the day of his TASER activation. Similarly, subject No. 5 had known epilepsy, experienced a seizure, and was in a combative postictal state immediately before and during the time of TASER activation.

Dr Zipes also reports that, in all of the cases, subjects received shocks “with one or both barbs in the anterior chest near or over the heart,” but never provided specifics on probe location nor differentiates between probe and drive stun deployments. In subject No. 5, the table reports “13 shocks totaling 62 seconds in <3 minutes.” Based on his reporting, the reader would conclude that he received 62 seconds of activations “over the heart.” However, the reality is that he only received the initial activations in probe mode with the majority actually in drive stun mode to the leg.

Dr Zipes opines that various experimental studies support his conclusion that the TASER can cause cardiac capture and induce ventricular fibrillation or ventricular tachycardia in humans. The author cites

porcine model studies in which electronic control devices were used to induce ventricular fibrillation or cardiac dysrhythmias in small swine in unique and unrealistic settings. Swine fibrillate more easily than humans, and their conduction system has a different anatomy, but even the studies that he cites did not conclude that electronic control devices cause ventricular fibrillation or dysrhythmias in humans.<sup>4,5</sup> No X26 electronic control device studies with human subjects have demonstrated a single incident of cardiac capture or dysrhythmia without an exogenous pathway for conduction to the heart, such as pacemaker wires. In addition, more than a million volunteers have undergone TASER activations, many with the probes placed across the cardiac axis, and there has never been a loss of consciousness or death reported under these circumstances.

We appreciate the efforts of Dr Zipes in looking deeper into the important topic of sudden in-custody deaths, a very complex issue. There are many similar sudden deaths of subjects taken into custody who are not exposed to a TASER activation. It is our opinion that, although this article brings up questions and areas that need further research, this case series in and of itself does not support that TASERs are a substantial risk to the public.

## Disclosures

All 3 of the authors have been involved as expert witnesses in lawsuits that have involved the use of TASER devices.

Gary M. Vilke, MD

Theodore C. Chan, MD

University of California, San Diego

Department of Emergency Medicine

University of California, San Diego Medical Center

San Diego, CA

Steven Karch, MD

Berkeley, CA

## References

1. Zipes DP. Sudden cardiac arrest and death following application of shocks from a TASER electronic control device. *Circulation*. 2012;125:2417–2422.
2. Kitzman DW, Scholz DG, Hagen PT, Ilstrup DM, Edwards WD. Age-related changes in normal human hearts during the first 10 decades of life: part II (maturity)—a quantitative anatomic study of 765 specimens from subjects 20 to 99 years old. *Mayo Clin Proc*. 1988;63:137–146.
3. Zipes DP, Wellens HJ. Sudden cardiac death. *Circulation*. 1998;98:2334–2351.
4. Lakkireddy D, Wallick D, Ryschon K, Chung MK, Butany J, Martin D, Saliba W, Kowalewski W, Natale A, Tchou PJ. Effects of cocaine intoxication on the threshold for stun gun induction of ventricular fibrillation. *J Am Coll Cardiol*. 2006;48:805–811.
5. Nanthakumar K, Billingsley IM, Masse S, Dorian P, Cameron D, Chauhan VS, Downar E, Sevaptisid E. Cardiac electrophysiological consequences of neuromuscular incapacitating device discharges. *J Am Coll Cardiol*. 2006;48:798–804.

## Letter by Vilke et al Regarding Article, "Sudden Cardiac Arrest and Death Following Application of Shocks From a TASER Electronic Control Device"

Gary M. Vilke, Theodore C. Chan and Steven Karch

*Circulation*. 2013;127:e258

doi: 10.1161/CIRCULATIONAHA.112.119990

*Circulation* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2013 American Heart Association, Inc. All rights reserved.

Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://circ.ahajournals.org/content/127/1/e258>

**Permissions:** Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Circulation* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

**Reprints:** Information about reprints can be found online at:  
<http://www.lww.com/reprints>

**Subscriptions:** Information about subscribing to *Circulation* is online at:  
<http://circ.ahajournals.org/subscriptions/>