
We appreciate the correspondence from Drs Ristagno and Li. We also thank them and their colleagues for their many contributions to the resuscitation literature and for the most recent in their series of work on the use of amplitude spectrum area both for the prediction of defibrillation success and as a surrogate marker for cardiopulmonary resuscitation (CPR) quality. Ventricular fibrillation (VF) has long been viewed as a ubiquitous condition best treated with immediate defibrillation, yet the evolution of our understanding of this lethal arrhythmia, the optimal timing for defibrillatory shocks, and the interaction between CPR quality and changes in the VF waveform has only recently begun to flourish.

The threshold value chosen for our study did, as the authors of the letter suggest, have an 80% sensitivity and 60% specificity, but importantly, those values were for the likelihood of achieving return of spontaneous circulation with immediate defibrillation, not simply defibrillation success. Nevertheless, it follows that patients whose VF values were below that threshold would be considered unlikely to achieve return of spontaneous circulation with immediate defibrillation. It was for that reason that patients in the study arm were allocated to a CPR interval before the initial defibrillation attempt, yet their outcomes were not different from those treated with initial defibrillation. Taken as a whole, this may be considered disappointing (as Drs Ristagno and Li state) and may suggest that the VF value, although prognostic, does not suggest a therapeutic strategy likely to be more beneficial than immediate defibrillation.

However, we find our study results to be encouraging given the subgroup analysis in which patients allocated to the study arm whose VF values improved during the CPR interval demonstrated improved outcomes compared with those whose values declined. With this result taken together with the work by Ristagno and colleagues demonstrating the correlation between CPR quality characteristics and VF amplitude spectrum area, it might be reasonably deduced that variation in CPR quality rather than the particular threshold value chosen for our study or the use of a single threshold value may have influenced the outcome results. Regardless of the means used to allocate patients with a low probability of defibrillation success/return of spontaneous circulation to a CPR treatment interval, the quality of the CPR must be ensured, and future studies in this area should both measure and control for its effects. If not measured, such confounders can certainly limit the potential for translating retrospectively derived concepts into prospectively validated therapeutic strategies.

Finally, we also agree with Drs Ristagno and Li that the use of continuous real-time VF waveform analysis may allow a more optimal treatment model. No longer viewed as a ubiquitous condition and rapidly being understood to perhaps require even more than a dichotomous treatment algorithm, VF represents a dynamic electrophysiological process that may require an equally dynamic treatment methodology to truly optimize each patient’s outcome potential. Understanding the interplay between CPR, defibrillation, and the myocardial milieu to the extent that we might develop such treatments remains our unanswered challenge.

Source of Funding
The Fire Department of New York and London Ambulance Service received grant support for the study from Philips Healthcare.

Disclosures
None.

References
Response to Letter Regarding Article, "Waveform Analysis–Guided Treatment Versus a Standard Shock-First Protocol for the Treatment of Out-of-Hospital Cardiac Arrest Presenting in Ventricular Fibrillation: Results of an International Randomized, Controlled Trial"

John P. Freese, Dawn B. Jorgenson, Ping-Yu Liu, Jennifer Innes, Luis Matallana, Krishnakant Nammi, Rachael T. Donohoe, Mark Whitbread, Robert A. Silverman and David J. Prezant

_Circulation_. 2014;129:e649
doi: 10.1161/CIRCULATIONAHA.114.009344

_Circulation_ is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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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/129/23/e649

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