LETTER

# End-of-life electrical surges

We read the study by Borjigin et al. about postcardiac arrest electrical activity and the possible explanation for near death experiences (NDEs) with great interest (1). Our research group at The George Washington University Medical Center published an observation of end-of-life electrical surges (ELES) in 2009 (2). In that study, we proposed that ELES could be responsible for NDEs, and this new study largely confirms that hypothesis. However, it is important to recognize that nothing has been definitively proven. Nonetheless, the findings of multiple research groups confirm that organized electrical activity can emanate from the brain at the time of death (3, 4). Our ongoing research here at The George Washington University Medical Center suggest that about half of patients who succumb in the intensive care unit display an ELES, and the waveform is at a higher frequency than that observed in animals. The significance of ELES remains unknown and is the source of significant controversy.

Many would argue that studying death is not productive because, after all, the outcome is not changed. However, there are clear spiritual, religious, and existential questions about death that remain unanswered, and a better understanding of what happens to the brain at the time of death will help physicians address the many concerns that families and patients have regarding this event. Unfortunately, end-of-life high-quality research has been largely unfunded and neglected. In our opinion, this represents an important beginning in this area, and we look forward to future research efforts that better elucidate what exactly happens in the brain at the time of cardiac death. Not unlike when Galileo first raised his telescope to the sky, many new observations will be made that will generate many more questions before we will have satisfactory answers.

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**1** Borjigin J, et al. (2013) Surge of neurophysiological coherence and connectivity in the dying brain. *Proc Natl Acad Sci USA* 110(35): 14432–14437.
**2** Chawla LS, Akst S, Junker C, Jacobs B, Seneff MG (2009) Surges of electroencephalogram activity at the time of death: A case series. *J Palliat Med* 12(12):1095–1100.
**3** Auyong DB, et al. (2010) Processed electroencephalogram during donation after cardiac death. *Anesth Analg* 110(5):1428–1432.
**4** van Rijn CM, Krijnen H, Menting-Hermeling S, Coenen AM (2011) Decapitation in rats: Latency to unconsciousness and the 'wave of death' *PLoS ONE* 6(1):e16514.

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