LETTER

Surge of neurophysiological activity in the dying brain

Borjigin et al. (1) describe recordings from electrodes implanted in rat brains that were made during and after cardiac arrest in rats. The surprising and unexplained 30-s surge in electrical coherence and connectivity certainly merits further study, but the authors' suggestion that this transient electrical surge has implications for near-death experiences in humans seems premature to us.

First, it is impossible to establish what, if anything, the rats were experiencing during the postarrest period of the surge.

Second, the activity observed following cardiac arrest represents a tiny fraction of the total neuroelectric power present just before arrest (as indicated in figures 1 and 2 of Borjigin et al.), and thus it is misleading to describe these rat brains as being "hyperaroused." All that can be concluded is that activity of unknown functional significance occurred at a few places in the EEG frequency spectrum in the context of near-total obliteration of activity accompanying the waking state. The pertinent question here is not whether there is any brain electrical activity at all after cardiac arrest, but whether there is activity of the type currently thought to be necessary for conscious experience.

Third, the relevance of these findings in rats to human brain physiology is unclear. Monitoring of cortical electrical activity in humans during cardiac arrest has documented a slowing and attenuation of EEG activity in humans detected an average of 6.5 s after cardiac arrest, progressing to isoelectricity and absence of evoked potentials within 10–20 s (2).

Fourth, many reports of near-death experiences include verifiable perceptions by the experiencer that are anchored to specific time periods far longer than 30 s after cardiac arrest (3), the duration of the electrical surge in this study.

Fifth, many near-death experiences occur under conditions that do not involve cardiac arrest or decreased cerebral perfusion (4).

Sixth, about a quarter of reported near-death experiences occur under general anesthesia (5), but the rats in the study by Borjigin et al. did not show the observed postarrest EEG patterns under anesthesia.

Seventh, all of the rats exhibited the same stereotyped pattern of high-frequency EEG activity following cardiac arrest, but only 10–20% of humans undergoing cardiac arrest report near-death experiences (4).

For these reasons we believe that the finding of Borjigin et al. of surprising brain electrical activity after cardiac arrest, although intriguing and meriting further investigation, is unlikely to contribute to an understanding of near-death experiences.

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