Studying death and near-death experiences requires neuroscientific expertise

Charlotte Martial¹,²*, Olivia Gosseries¹,², Héléna Cassol¹, Daniel Kondziella³,⁴*

¹ Coma Science Group, GIGA-Consciousness, University of Liège, Liège, Belgium
² Centre du Cerveau², University Hospital of Liège, Liège, Belgium
³ Department of Neurology, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark
⁴ Department of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark

* Corresponding authors: cmartial@uliege.be; daniel.kondziella@regionh.dk
Abstract:

Parnia et al.\(^1\) recently published suggestions for the study of death and experiences recalled in a near-death context. We have serious reservations about the authors’ statements. In this commentary, we discuss the omissions and knowledge gaps inherent to the authors’ paper, which among others include incorrect neurological claims about brain death and misunderstandings regarding the terminology of consciousness. Although we believe that (near-)death research deserves a framework guideline, the paper by Parnia and colleagues is misleading and, contrary to the authors’ intention, hinders the scientific understanding of near-death experiences and the neural mechanisms occurring in the dying brain.

**Keywords:** cardiac arrest, death, near-death experience, consciousness, responsiveness

We read with interest the paper of Parnia et al.\(^1\) aiming to introduce guidelines for the study of death and experiences recalled in a near-death context. We appreciate the authors’ efforts in trying to analyze the difficulties that the field of (near-)death research faces. However, their proposed “consensus guideline” lacks empirical support for many of the authors’ claims related to near-death experiences (NDEs) and includes incorrect statements about the underlying neurological mechanisms in the dying human brain.

First, the paper contains inaccurate, highly problematic neurological statements, foremost one that borders on a misunderstanding of the brain death concept:

“People […] declared dead according to brain death criteria may not demonstrate histopathological evidence of brain cell death on autopsy. This suggests that […] while the underlying […] brain injury/disorder [may be] “irreversible,” the biological/cellular point of irreversibility may not have yet been reached in some [of these people]” (p. 2 of File S1 from\(^1\)).

This statement is wrong because it ignores the fact that brain death criteria explicitly require structural, destructive, and irreversibly fatal brain damage to be present and well-documented. Restated, a brain death protocol is stopped immediately when it is evident that repeated neuroimaging reveals lack of major cerebral injury, and thus neuronal cell death.\(^2\) What the authors fail to clarify here is that not all cells in the brain die simultaneously, which explains that, for example, depending on the specific brain death protocols used, islands of cortical cells may show residual function as revealed by certain brain death cases with rudimentary EEG activity,\(^3\) or rudimentary brainstem perfusion may be present when the documentation of absent intracranial circulation is not required.\(^2\) Similarly, although the authors are correct that only 2% of people are declared dead according to brain death criteria, it is problematic when this information is not put into context: Every human death (in the biological sense) is ultimately brain death, regardless of the cause.\(^4\) This lack of neurological precision is unfortunate. Accurate scientific definitions of the brain death and cardiac death concepts are indispensable in a paper aiming to describe and develop guidelines for the study of death.

Second, contrary to what Parnia et al.\(^1\) write, people who recall NDEs are therefore inherently people who have not been dead and have not met brain death criteria. Since the introduction of brain death criteria in the 1960s,\(^5\) not a single patient properly diagnosed as brain dead has come back to life.\(^6,8\) All reports of “brain death mimics” (for examples, see\(^9,10\)) have ignored the fundamental prerequisite for a brain death protocol that there has to be, as stated earlier, well-documented and irreversibly fatal brain damage.\(^7\) Because of these scientific inaccuracies, the proposed term “recalled experience of death” is wrong and we firmly reject it. The authors confuse “death” with the process of dying:

“Anyone with a preserved mental state (state of consciousness during wakefulness) cannot be considered to have had a severe enough life-threatening disorder, and their experiences cannot be considered in relation to death or critical illness. Consequently, their experiences cannot be labeled using the terms “near-death” or NDE” (p. 10 from\(^1\)).
Here, the authors make a logical fallacy. It is a prerequisite for being able to report an NDE that during the actual experience the person has had a functioning brain and has survived without extensive brain damage. Without a functioning brain, how would it be possible to have such a detailed experience, store it for long periods of time, retrieve it from memory, and then narrate it eloquently many years later?

There is not a single empirical study with a sufficiently rigorous methodology to reliably confirm that people are able to report actual (real-life) events and details happening during e.g., cardiopulmonary resuscitation. In one of the most rigorous studies, Parnia and co-authors\(^\text{11}\) claimed that 1 of 330 cardiac arrest survivors (i.e., 0.3%) reported some elements from the surroundings during his/her cardiopulmonary resuscitation. However, the authors’ protocol did not allow to rule out the possibility that the report of that single person was a false memory, built in retrospect upon prior, unrelated memories and expectations.

There is hence no “recalled experience of death”; if anything, it should be ‘recalled experience of what might have been the start of the dying process just before consciousness was lost’.

Third, the authors write that NDEs in post-cardiac arrest patients fundamentally differ from NDEs made in other life-threatening or non-life-threatening situations, and that the latter experiences are “mislabeled”. Again, the reasoning is flawed. There are no empirical data so far to indicate that the phenomenology of NDE differs in situations that are (a) associated with a threat to life and impaired brain physiology such as a cardiac arrest, (b) associated with a threat to life but unimpaired brain physiology such as a near-miss traffic accident, and (c) associated with non-life-threatening situations such as drug consumption or meditation. To the contrary, the data that do exist indicate that all these experiences are phenomenologically similar (e.g.,\(^\text{12-16}\)). In other words, from the phenomenology of the experience one cannot tell if what happened was a cardiac arrest or e.g., use of a psychedelic drug. Contrary to what the authors state, this similarity suggests that the brain mechanisms behind these experiences are probably also similar, if not identical.

Fourth, the authors embark on an unfortunate discussion about whether NDEs are “real” or “unreal”. There is no need to doubt that people’s experiences are real in so far as almost all these people experience what they experience: Malingering is an extremely rare phenomenon. The key question is, what are the cerebral mechanisms behind these experiences? Like many people interested in NDEs, the authors fail to recognize that NDEs are conscious experiences, albeit corresponding to a state of disconnected consciousness,\(^\text{17}\) generated by neurophysiological, cerebral mechanisms.

Fifth, there are inconsistencies and controversies in the terminology used in the paper. For example, expressions such as “a heightened sense of consciousness” or “well-structured thought processes” are neither scientific nor unambiguous. Another example is the use of the outdated term “persistent vegetative state” (PVS). The American Academy of Neurology (AAN) and other institutions recommend to avoid this term,\(^\text{18}\) and the abbreviation ‘PVS’ is confusing as it is the same for “permanent vegetative state”.\(^\text{19}\) Moreover, it is incorrect that patients in a vegetative state (a term that, owing to its pejorative connotations, was renamed ‘unresponsive wakefulness syndrome’ more than 10 years ago\(^\text{20}\)) “have irreversibly lost consciousness” (p. 13 from\(^1\)) since most of these patients will recover to at least a minimally conscious state with prolonged follow-up.\(^\text{21,22}\) Finally, the most important flaw is related to the expressions “loss of consciousness” and “unconsciousness”. The authors argue that “a period of [loss of consciousness] is a prerequisite for reported memories that occur during life-threatening/critical care disorders” (p. 10 from\(^1\)).

This paradox reflects the paper’s lack of neuroscientific expertise. Rather than concluding that NDEs made during cardiac arrest are evidence for human consciousness being able to exist outside a functioning brain, the most parsimonious explanation is that NDEs are made just prior to the loss of consciousness (or
immediately after consciousness is regained)—and hence can be remembered with successful resuscitation. Subjective experiences that can be reported, in whatever the context, are conscious experiences. Perhaps the authors wanted to refer to an absence of responsiveness, i.e., a lack of behavioral interaction with the outside world, but lack of responsiveness must not be confused with lack of consciousness, as evidenced by residual consciousness during anesthesia, rapid and non-rapid eye movement sleep or brain injury with cognitive motor dissociation. Analogous to these conditions, NDEs are made during a state of internal awareness in unresponsive states.

Sixth, despite the extensive reference list, the authors fail to cite and discuss several important studies, including those investigating what happens in the dying human brain using intracranial recordings in people who were, in fact, dying, and work discussing how cortical spreading depolarizations and spreading ischemia during the dying process might give rise to NDE, and how phylogenetics might offer an explanation for the evolutionary origin of NDEs.

Finally, the authors criticize the grading scales developed for the scientific study of NDEs, but not all their arguments are compelling. NDEs are challenging to investigate because they rely on first-person narratives, which like other disconnected conscious states—such as dreaming—are inherently subjective. Martial et al. recently developed a standardized scale with strong psychometric properties for improved quantification and characterization of NDEs. Contrary to what Parnia et al. write, this Near-Death Experience Content (NDE-C) scale does overcome some of the limitations of the NDE scale developed by Greyson like a failure to account for distressing NDE experiences (for details). Although Parnia et al. question the existence of distressing NDEs which they consider “related to [intensive care unit] delirium, delusions, and dreams in response to toxic metabolic states and withdrawal states (e.g., alcohol withdrawal)” (p. 17 of File S2 from), the latter claim is not empirically supported.

In conclusion, the “guidelines and standards” by Parnia and colleagues do not contribute to the scientific understanding of NDEs and the dying process. The authors combine in their publication two different aspects of the phenomenon of death: On the one hand, the cellular mechanisms occurring in the dying brain, and on the other hand, the subjective experiences that people report when facing life-threatening situations. These two aspects are best kept separate to avoid confusion between NDE and the concept of brain death.

Although (near-)death research certainly merits a framework directive, the paper by Parnia et al. is subject to a surprising lack of neuroscientific understanding. It reflects the fact that the field of NDE research (at least in parts) is biased by a widely held belief that there is something fundamentally special, if not supranatural, about NDEs, such as the notion that humans can have conscious experiences in the absence of a functioning brain.

Competing interest statement
The author declares no competing interests.

Authors contributions
CM and DK have drafted the original manuscript; all authors have revised the manuscript.

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