

Brain Death: Can It Be Resuscitated?

The President's Council's white paper is brave but flawed.

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Why is a patient with a destroyed brain considered dead rather than moribund and irreversibly comatose? The world has been grappling with this question for the past four decades with little success. The recently released white paper of the President's Council on Bioethics is in many respects a refreshing, thoughtful, and comprehensive reexamination of this complex topic.¹ It offers a very helpful analysis of the major positions on the determination of death, and it proffers a creative new solution of its own. Unfortunately, the new solution does not put the problem to rest, but the humility with which the council discusses its own position and the honesty with which it confronts the consequences of being wrong alone make this report a very commendable document.

Historical Backdrop

What is refreshing about the white paper emerges best when it is put in historical perspective. In 1968, the Harvard Committee catalyzed a monumental socio-medico-legal revolution: the reformulation of death in terms of brain function.² The only rationale given by the committee for why the irreversible cessation of all brain functions should be equated with death was legal utility: it would free up beds in intensive care units and facilitate organ transplantation.

The Harvard report ushered in a brief era of wild transplantation.³ In a domino effect beginning in 1970, state after state revised its statutory definition of death, despite the absence not just of official diagnostic criteria for irreversible cessation of all brain functions, but also of any generally accepted philosophical rationale for why irreversible nonfunction of the brain should constitute death. By 1978, over thirty different diagnostic criteria had been published, none of them validated; neither had any consensus on the conceptual basis emerged.⁴

The next milestone in the history of "brain death" was the 1981 President's Commission.⁵ Its comprehensive report included a proposed Uniform Determination of Death Act (UDDA), which served as the model for the remaining twenty-three states that had not yet revised their death statutes to include a brain-based criterion. Its medical consultants proposed a set of diagnostic criteria that instantly became the standard for the United States. And most importantly, it articulated a then-plausible rationale for equating irreversible cessation of all brain function with death—namely, the loss of integrative unity of the organism. It argued that the brain is the body's central integrator, without which the body necessarily and imminently literally "dis-integrates" and succumbs to asystole despite all technological interventions. The President's Commission also maintained that "brain death" and ordinary death are physiologically identical states, only in the former case the equivalence is "masked" by artificial ventilation and circulatory support. That same year, James Bernat, Charles Culver, and Bernard Gert published an influential paper promoting even more forcefully the integrative unity rationale, which quickly became the mainstream conceptual justification for brain death in the United States and many other countries.⁶

Over the next two decades, however, new clinical data made it increasingly clear that patients with total brain failure were *not* physiologically identical to non-heart-beating corpses, and they did *not* necessarily "dis-integrate" despite all technological support. Moreover, the rare longer-surviving ones exhibited holistic properties such as homeostasis, proportional growth (of a child), teleological repair, and general ability to survive outside a hospital setting with relatively little support (ventilator, tube feedings, and nursing care—much less than many sick patients in intensive care units require, who are nevertheless clearly living organisms). Such properties are difficult to reconcile with the mainstream assumption that these bodies were nothing but bags of partially interacting subsystems.

The mainstream rationale also made little headway into the minds of people at large. Even now, reporters refer to "brain-dead" patients as being "kept alive" by machines or as "dying" when the ventilator is turned off. Much of the public and a surprising proportion of the medical profession still consider "brain-dead" patients "as good as dead" or "better off dead," but not yet *really* dead. Moreover, many who do regard them as dead do so on the grounds of loss of personhood (by virtue of permanent unconsciousness) from a biologically still living human organism—grounds that would also categorize patients in a permanent vegetative state as dead.⁷

Medical organizations have been strangely silent on their own rationale for equating "brain death" with death, limiting their official statements to purely diagnostic considerations.⁸ The same can be said about various highly respected neurologists, apart from Bernat, who have authored books and chapters on brain death. But every now and then a Freudian slip reveals that the author's unstated rationale is *not* the mainstream one. In their popular textbook *Principles*

of *Neurology*, for example, Allan Ropper and Robert Brown wrote: “In exceptional cases [of brain death], however, the provision of adequate fluid, vasopressor, and respiratory support allows *preservation of the somatic organism in a comatose state* for longer periods.”⁹ Regarding a series of seventy-three brain-dead patients, Fred Plum wrote that “half experienced asystole by the third day but the bodies of 2 *lived on* until the 10th and 16th day.”¹⁰ And the late Dr. Ronald Cranford wrote, regarding patients in permanent vegetative state, “that permanently unconscious patients have characteristics of both the living and the dead. It would be tempting to *call them dead and then retrospectively apply the principles of death, as society has done with brain death.*”¹¹

Philosophers and bioethicists have become increasingly unconvinced by the organismic unity rationale, many preferring instead some variation of the personhood rationale.¹² In this they are joined by certain prominent neurologists, such as Plum and Calixto Machado, as well as by many rank-and-file neurologists.¹³ Some experts have opined that “brain death” is *not* death after all, but that it doesn’t matter anyway for ethical organ harvesting.¹⁴

Thus, the much-touted international “consensus” on a neurological standard of death is only skin deep.¹⁵ The widespread superficial agreement that “brain death” is death conceals a widespread disagreement over the reason why, and even much schizophrenic tacit belief to the contrary. “Brain death as death” began as a utilitarian legislative decree and has remained a conclusion in search of a justification ever since: a conclusion clung to at all costs for the sake of the transplantation enterprise that quickly came to depend on it.

The White Paper

Against this backdrop, the President’s Council’s white paper stands out as a beacon and a breath of fresh air in a number of respects. The council articulately and concisely summarizes the issues and the various positions that have been advanced over the years. The superb chapter on terminology discards the question-begging and ambiguous term “brain death,” replacing it with the philosophically neutral and physiologically clearer term “total brain failure.” The council upholds the Kantian prohibition against using human beings merely as means to an end and not also as ends in themselves (p. 72), thereby excluding any relaxation of the “dead donor rule” and warning of the ethical dangers inherent in relying on non-heart-beating donors.¹⁶ Also, its cautionary attitude regarding patients diagnosed as being in a persistent vegetative state—whether they truly lack all subjective awareness, as is commonly assumed—is noteworthy and should be widely heeded (pp. 42–44).

Regarding the various proposed rationales for equating total brain failure with death, the council explicitly rejects the 1968 Harvard Committee’s social construct approach (pp. 49–50). It also follows most other commentators in rejecting the “higher-brain-death” position (according to which death occurs when the higher brain functions that are purportedly responsible for personhood are lost) (pp. 50–52). More remarkable, however, is the council’s studied rejection of the mainstream rationale of organismic integrative unity. “If being alive as a biological organism requires being a whole that is more than the mere sum of its parts, then it would be difficult to deny that the body of a patient with total brain failure can still be alive, at least in some cases” (p. 57).

In effect, the council rejects *all* previously advanced rationales for a neurological standard of death. In the face of this unsettling conclusion, it sees only two possible options. Position one is simply to conclude that “there is no sound biological justification for today’s neurological standard.” Position two is to posit a completely novel rationale, “a more compelling account of *wholeness* that would support the intuition that after total brain failure the body is no longer an organismic whole and hence no longer alive” (p. 60). A majority of the council came down in favor of position two.

[D]eath remains a condition of the organism as a whole and does not, therefore, merely signal the irreversible loss of so-called higher mental functions. But reliance on the concept of “integration” is abandoned and with it the false assumption that the brain is the “integrator” of vital functions. Determining whether an organism remains a *whole* depends on recognizing the persistence or cessation of the fundamental vital *work* of a living organism—the work of self-preservation, achieved through the organism’s need-driven commerce with the surrounding world. When there is good reason to believe that an injury has irreversibly destroyed an organism’s ability to perform its fundamental vital work, then the conclusion that the organism as a whole has died is warranted. . . . Thus, on this account, total brain failure can continue to serve as a criterion for declaring death—not because it necessarily indicates complete loss of integrated somatic functioning, but because it is a sign that this organism can no longer engage in the essential work that defines living things. (pp. 60, 64–65)

The council singles out two forms of environmental commerce as conceptually important: breathing and consciousness. According to position two, at least one of these is necessary for a higher organism to be a living whole; conversely, the irreversible loss of both suffices to constitute cessation of the organism as a whole—that is, death (p. 64). The council thereby aligns itself in many respects with the “brainstem death” notion of the United Kingdom and Canada, although with a purportedly more robust philosophical justification (pp. 65–67).

The council is to be commended for its creativity in developing the first new rationale for the neurological standard of death in many years. Although the majority of council members found position two “more compelling” than the integrative unity rationale, it remains to be seen how many others will find it so after thorough public debate. A minority of members disagreed with position two, including chairman Ed Pellegrino. (At least one member, Floyd Bloom, disagreed with position two in the opposite direction, opining in essence that irreversible unconsciousness *alone* suffices for death on the basis of loss of human personhood—the “higher brain-death” standard.)

The Problems with Position Two

Alas, this commentator is yet another who fails to be convinced by position two, for multiple reasons. First and foremost, the concept of “wholeness” is never defined. If it is to be understood as a necessary characteristic of life, it certainly *cannot* be read as meaning “entire” or “complete.” I’m sure the council would agree; otherwise, amputees would not qualify as living organisms. On numerous occasions, the council employs the phrase “organism as a whole” to describe the kind of wholeness that is relevant. But by what contortion of semantics can an admittedly integrated unity that is more than the sum of its parts not be a “whole”? And what lexicon defines “wholeness” exclusively in terms of externally directed “work”?

Furthermore, why is it simply assumed, without argument, that the *only* kind of “fundamental vital work of a living organism” is “the work of self-preservation, achieved through the organism’s need-driven commerce with the surrounding world”? Why should immanent work on a holistic level—such as self-development (for instance, of an embryo) and self-maintenance (for instance, internal homeostasis, orderly turnover of cells and tissue components, or teleological repair)—not also count as legitimate examples of “fundamental vital work of a living organism”? Perhaps only because of a tacit a priori determination to save the neurological standard at all intellectual costs?

The council seems to backtrack on its rejection of internal integration when it states about some cases of total brain failure that “globally coordinated work continues to be performed by multiple systems, all directed toward the sustained functioning of the *body as a whole*. *If being alive as a biological organism requires being a whole that is more than the mere sum of its parts, then it would be difficult to deny that the body of a patient with total brain failure can still be alive, at least in some cases*” (p. 57, emphasis added). So it is a “whole” after all. But then a few pages later: “If these kinds of integration were sufficient to identify the presence of a living ‘organism as a whole,’ total brain failure could not serve as a criterion for organismic death, and the neurological standard enshrined in law would not be philosophically well-grounded” (p. 60). Given that the white paper then presents what it considers to be its “more compelling” philosophical grounds for preserving the neurological standard, the council in this section is in effect claiming that the body of a patient with total brain failure is *not* a “whole” after all. There can be no logical flow when a pivotal term such as “whole” is never defined, is often juxtaposed against what is ordinarily taken as a synonym (“unity”), and keeps changing implicit meaning.

But suppose we grant, just for the sake of argument, that it is possible for a unity not to be a whole, and that holistic, self-preserving, immanent dynamisms are not fundamental, vital works of a living organism. Position two still faces serious challenges. One problem is that it conflates physical necessity for *staying* alive (in the wild) with logical necessity for *being* alive (ontologically). Breathing, eating, drinking, seeking sustenance, and avoiding predators are (physically) necessary for self-preservation in the wild, but not in a hospital. The cessation of any or all of them in the wild will inextricably lead to death, but that cessation is not already death per se. External assistance for an organism with such disabilities will forestall death, not “mask” it (p. 61).

The council also conflates “sufficiency of sign X to prove life” with “sufficiency of irreversible-lack-of-X to prove death.” (For simplicity, let “life” and “death” refer to the organism as a whole, and let “lack” mean “irreversible lack.”) The white paper frequently alludes to self-preserving commerce with the environment as a fundamental and characteristic sign of organismic wholeness and life, which is undeniably true but utterly irrelevant to the search for a reliable sign of death (pp. 62–64). The key logical equivalences are these: the claim “X is sufficient to prove life” is equivalent to the claim “lack-of-X is necessary to prove death,” and “lack-of-X is sufficient to prove death” is equivalent to “X is necessary to prove life.” Of all the potential candidate-signs X, the council reviews the traditional three: conscious awareness, breathing, and circulation. Let us call them A, B, and C. The council asserts several points regarding their respective sufficiency or necessity as signs of life or death:

1. The lack of any one of them alone is insufficient to prove death.
2. Presence of A or B alone (but not C alone) suffices to prove life.
3. In combination, the absence of *both* B and C (and as a physical consequence, also A) is sufficient to prove death (this is equivalent to the first arm of the bifurcated UDDA, the traditional cardiopulmonary criterion).
4. The absence of *both* A and B is also a sufficient sign of death (this is equivalent to the second arm of the UDDA,

the neurological standard).

When individual signs are combined into a composite criterion for life or death, the logic of sufficiency and necessity quickly becomes complicated. In fact, the possibilities that must be considered increase exponentially with each independent factor: sign A, B, or C; presence or absence; sufficiency or necessity; proving life or death.

The white paper blurs these critical distinctions, forsaking logical rigor. The logical counterpart of “either A or B suffices to prove life” is “lack of both A and B is necessary to prove death.” But what position two asserts is: “lack of both A and B is both necessary *and sufficient* to prove death.” That may be true, but it does not logically follow from the painstakingly established premise that the presence of A or B is sufficient to prove life. To establish that lack of both A and B is sufficient to prove death, the council would have had to demonstrate that, of the myriad possible candidate signs, A and B are the *only* two that are individually sufficient to prove life. (If some other sign were also sufficient, its presence, despite the joint absence of A and B, would prove life; hence the joint absence of A and B would be insufficient to prove death.¹⁷) Yet the council makes no attempt at such an argument, perhaps because the claim would hardly be plausible.

This brings us to another serious problem with position two. What exactly characterizes signs A and B, whose joint absence purportedly suffices to prove death? The very notion of “self-preserving commerce with the environment” needs clarification if it is to serve as the cornerstone of position two. The white paper seems ambivalent and at times inconsistent regarding what it considers key: is it the *actual exchange* of substances with the environment (or adaptive sensorimotor interaction, in the case of consciousness), or rather the *inner drive* to exchange substances (or to adaptively interact). The discussion of “vital functions” in chapter three (preceding the presentation of position two) repeatedly emphasizes that it is the actual exchange of gases across the alveolar membrane that is the work” and environmental “commerce” that counts with regard to respiration (pp. 22–25). Regarding the inner drive to breathe, mediated by the brainstem, the council states that, “For the purposes of our inquiry, the crucial fact about the mechanics of breathing is this: When the brainstem’s respiratory centers are incapacitated, the organism will not make or display any respiratory effort. . . . *If the death of the organism is to be prevented, some external ‘driver’ of the breathing process—a mechanical ventilator—must be used*” (pp. 26–27).¹⁸

Taken together, such passages indicate that the critical respiratory “commerce,” as understood by the council, is the actual exchange of gases between organism and environment and not the inner drive to breathe per se. Something analogous could be said about a comatose or totally paralyzed patient’s self-preserving sensorimotor interaction with the environment. Paraphrasing the emphasized quoted sentence just above, “If the death of the organism is to be prevented, some external ‘sensorimotor interactor’—a caregiver—must be used.” Other passages from the white paper also reinforce the idea that the “fundamental vital work” at issue is the actual self-preserving “commerce” with the environment, and not a purely internal drive towards it (pp. 60–61).

On the other hand, still other passages seem to indicate just the opposite. For example: “[A]rtificial, non-spontaneous breathing produced by a machine . . . is not driven by *felt need*, and the exchange of gases that it effects is neither an achievement of the organism nor a sign of its genuine vitality” (p. 63, emphasis in original). A footnote of the white paper and the personal statement of Gilbert Meilaender supporting position two also emphasize that the *inner drive* to self-preserving commerce with the environment is what counts for organismic wholeness, not the actual commerce itself.¹⁹

The inner drive to breathe, mediated by the medullary respiratory centers, is of course absent in patients with total brain failure. But it can also be absent in conscious patients with lower brainstem lesions, and during sleep in patients with Ondine’s curse (in whom the lack of drive is arguably also “irreversible,” insofar as the person will die during sleep, at least without ventilatory assistance). So even the inner drive to breathe is not a *necessary* feature of organismic wholeness. Neither is inner consciousness, as acknowledged repeatedly in the white paper. The council fails to offer any reasoned argument why the combined absence of these two inner drives, neither of which alone suffices as an indicator of organismic death, together should suffice. Moreover—and very importantly—if primacy is to be given to inner drive over actual “commerce,” then position two comes perilously close to conceding that *purely internal properties*, apart from any self-preserving exchange with the environment, *can be relevant for organismic wholeness after all*.

There are also counterexamples that undermine the logic of position two. For example, a human fetus has neither breathing (since the rhythmic contraction of the respiratory muscles moving amniotic fluid in and out of the lungs is not “breathing” in the life-preserving sense of position two), nor a drive to breathe, nor conscious self-preserving interaction with the (maternal) environment, yet it is unquestionably alive and a “whole” organism. And this is true not only (not even primarily) because eventually, after birth, it will breathe and consciously interact, but because of its manifestly holistic properties while still in utero. For the fetus with an undeveloped brain, the placenta is analogous to the ventilator and feeding tube for a brain-damaged patient who depends on them for survival.

Finally, there is a logical disconnect between apneic coma being the conceptual essence of the neurological standard of death and the requirement of total brain failure. The council explains that, given the pathophysiological vicious cycle of brain swelling and herniation, the only way to guarantee the irreversibility of both coma and apnea is to require that herniation has run its full course—that is, that there is *total* brain failure (pp. 66–67). (In this respect, position two differs significantly from the British notion of “brainstem death.”) Using totality as a surrogate for irreversibility assumes that all cases of irreversible apneic coma are the endpoint of the classical rostral-caudal sequence of brain destruction caused by transtentorial herniation. But if the medullary respiratory centers were always and necessarily the last thing to go, then it would be superfluous, in a case of known herniation, to require examination of all cranial nerve reflexes; demonstration of apnea alone would suffice to establish totality. Yet all published diagnostic criteria require explicit demonstration of absence of each and every cranial nerve reflex, in addition to an apnea test (notwithstanding that the apnea test is typically the last item performed in the sequence of tests). The experts responsible for these criteria would not have needed to formulate them that way if it were pathophysiologicaly impossible for herniation-to-the-point-of-apnea to be incomplete, sparing some brainstem functions (at least for a while) despite reaching the medullary respiratory centers.

Moreover, rostro-caudal herniation is *not* the only pathophysiological pathway to irreversible apneic coma. Primary brainstem lesions, such as infarcts, hemorrhages, and tumors, can be patchy, yet if strategically placed, can result in destruction of the medullary respiratory centers and critical portions of the reticular activating system, causing both irreversible apnea and coma, while mostly sparing other brainstem structures and the cerebral hemispheres. If irreversible apneic coma is the reason why total brain failure is death, then such cases of partial brain failure should equally qualify as dead.

In short, it seems doubtful that, even with a lot more work, position two could be made compelling enough to save the neurological standard.

Implications

These objections aside, the council’s white paper is both remarkable and courageous. It is remarkable for its reasoned assessment and rejection of all previously proposed justifications for a neurological standard of death. Although the council does not say it in so many words, it implies that over the past forty years, prior to the introduction of its own novel “commerce with the environment” rationale, all statutory death laws, all diagnostic criteria for “brain death,” and all transplantations from heart-beating donors have, in retrospect, been based on an invalid conceptual framework and incorrect empirical “facts” about bodies with total brain failure.

The council is courageous for its explicit readiness to accept the full ethical consequences if its proposed “commerce” rationale turns out not to hold any more conceptual water than its forerunners: “*If* indeed it is the case that there is no solid scientific or philosophical rationale for the current ‘whole brain standard,’ then the only ethical course is to stop procuring organs from heart-beating individuals” (p. 12, emphasis in original). This and similar statements are truly audacious in light of the council’s humility about its own conceptual innovation: regarding patients in total brain failure, for example, the council admits that “there is still reason to wonder if our knowledge of their condition is adequate for labeling them as dead” (p. 54).

The final sections of the paper, on the implications for policy and practice and on non-heart-beating organ donation, are also thoughtful and morally cautious. One point deserves greater elaboration, however. This is that although the council reaffirms the traditional requirement of consent for organ donation (p. 10), not once does it pair the term “consent” with “informed.” Yet this curious omission is actually typical for the literature on organ donation. “Informed” has *never* been a characteristic of the consent process for organ donation. With the council’s white paper, it is high time to confront this elephant in the room. Just as cigarette ads are required to contain a footnote warning of health risks, ads promoting organ donation should contain a footnote along these lines: “Warning: It remains controversial whether you will actually be dead at the time of removal of your organs. This depends on the conceptual validity of ‘position two’ in the analysis of the determination of death conducted by the President’s Council on Bioethics. You should study it carefully and decide for yourself before signing an organ donor card.”

Similarly, in conversations with families of patients in total brain failure, representatives of organ procurement organizations should frankly disclose the existence of ongoing controversies over whether their loved one is dead or in a deep, irreversible coma. Of course such information is never given, neither to the public nor to individuals, because it would likely decrease the number of donated organs. But perhaps the time has come for patient dignity and autonomy to take precedence over utility for the good of others, by reforming the consent process in this area to come up to the high standard of all other consents in health care—that is, by allowing the decision-maker to be truly informed.

1. President’s Council on Bioethics, *Controversies in the Determination of Death* (Washington, D.C.: President’s Council on Bioethics, 2008).

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3. M.A. DeVita, J.V. Snyder, and A. Grenvik, "History of Organ Donation by Patients with Cardiac Death," *Kennedy Institute of Ethics Journal* 3 (1993): 113-29.
4. P.M. Black, "Brain Death (Second of Two Parts)," *New England Journal of Medicine* 299 (1978): 393-401, at 395-96.
5. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, *Defining Death: Medical, Legal, and Ethical Issues in the Determination of Death* (Washington, D.C.: U.S. Government Printing Office, 1981).
6. J.L. Bernat, C.M. Culver, and B. Gert, "On the Definition and Criterion of Death," *Annals of Internal Medicine* 94 (1981): 389-94.
7. S.J. Youngner et al., "'Brain Death' and Organ Retrieval: A Cross-Sectional Survey of Knowledge and Concepts among Health Professionals," *Journal of the American Medical Association* 261 (1989): 2205-2210; L.A. Siminoff, C. Burant, and S.J. Youngner, "Death and Organ Procurement: Public Beliefs and Attitudes," *Kennedy Institute of Ethics Journal* 14 (2004): 217-34.
8. American Academy of Neurology, Quality Standards Subcommittee, "Practice Parameters for Determining Brain Death in Adults (Summary Statement)," *Neurology* 45 (1995): 1012-14; E.F. Wijdicks, "Determining Brain Death in Adults," *Neurology* 45 (1995): 1003-1011.
9. A.H. Ropper and R.H. Brown, *Adams and Victor's Principles of Neurology* (New York: McGraw-Hill, 2005), 962, emphasis added.
10. F. Plum, "Clinical Standards and Technological Confirmatory Tests in Diagnosing Brain Death," in *The Definition of Death: Contemporary Controversies*, ed. S.J. Youngner, R.M. Arnold, and R. Schapiro (Baltimore, Md.: Johns Hopkins University Press, 1999), 34-65, at 53, emphasis added.
11. R.E. Cranford and D.R. Smith, "Consciousness: The Most Critical Moral (Constitutional) Standard for Human Personhood," *American Journal of Law and Medicine* 13 (1987): 233-48, at 243, emphasis added.
12. For criticisms of organismic unity, see *Journal of Medicine and Philosophy* 26, no. 5 (2001), entire issue. On the personhood rationale, see J.P. Lizza, *Persons, Humanity, and the Definition of Death* (Baltimore, Md.: Johns Hopkins University Press, 2006); R.M. Veatch, "The Impending Collapse of the Whole-Brain Definition of Death," *Hastings Center Report* 23, no. 4 (1993): 18-24; R.M. Veatch, "The Death of Whole-Brain Death: The Plague of the Disaggregators, Somaticists, and Mentalists," *Journal of Medicine and Philosophy* 30 (2005): 353-78; M.B. Green and D. Wikler, "Brain Death and Personal Identity," *Philosophy and Public Affairs* 9 (1980): 105-33; R.M. Zaner, ed., *Death: Beyond Whole-Brain Criteria* (Dordrecht, the Netherlands: Kluwer Academic Publishers, 1988); R.J. Devettere, "Neocortical Death and Human Death," *Law, Medicine and Health Care* 18 (1990): 96-104.
13. F. Plum and J.B. Posner, *The Diagnosis of Stupor and Coma* (Philadelphia, Penn.: F.A. Davis Company, 1983), at 325; C. Machado, "A New Definition of Death Based on the Basic Mechanisms of Consciousness Generation in Human Beings," in *Brain Death. Proceedings of the Second International Conference on Brain Death*, ed. C. Machado (Amsterdam, the Netherlands: Elsevier, 1995), 57-66.
14. S.J. Youngner and R.M. Arnold, "Philosophical Debates about the Definition of Death: Who Cares?" *Journal of Medicine and Philosophy* 26 (2001): 527-37; R.D. Truog and W.M. Robinson, "Role of Brain Death and the Dead-Donor Rule in the Ethics of Organ Transplantation," *Critical Care Medicine* 31 (2003): 2391-96; N. Fost, "Reconsidering the Dead Donor Rule: Is It Important That Organ Donors Be Dead?" *Kennedy Institute of Ethics Journal* 14 (2004): 249-60; F.G. Miller and R.D. Truog, "Rethinking the Ethics of Vital Organ Donations," *Hastings Center Report* 38, no. 6 (2008): 38-46.
15. E.F.M. Wijdicks, "Brain Death Worldwide: Accepted Fact but No Global Consensus in Diagnostic Criteria," *Neurology* 58 (2002): 20-25.
16. All parenthetical references are to the white paper; President's Council on Bioethics, "Controversies in the Determination of Death: A White Paper by the President's Council on Bioethics" (Washington, D.C.: President's Council on Bioethics, 2009); <http://www.bioethics.gov/reports/death/index.html>.
17. The council acknowledges this reasoning when it explains that breathing is not a necessary sign of life: "Even if the animal has lost that capacity, other vital capacities might still be present" (p. 64). But it fails to use the same logic as

applied jointly to breathing and consciousness.

18. Emphasis added. Curiously, this statement is contradicted later in the white paper by another claim: “This drive [to breathe] is the organism’s own impulse, exercised on its own behalf, and indispensable to its continued existence” (p. 62). The claim that the drive to breathe is indispensable is patently false.

19. The footnote states: “Shewmon fails to convey the essential character of breathing. . . . [He] misses the critical element: the *drive* exhibited by the whole organism to bring in air, a drive that is fundamental to the constant, vital working of the whole organism” (p. 63, emphasis in original).

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