Research Article

A Thomistic defense of whole-brain death

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Michel Accad critiques the currently accepted whole-brain criterion for determining the death of a human being from a Thomistic metaphysical perspective and, in so doing, raises objections to a particular argument defending the whole-brain criterion by Patrick Lee and Germain Grisez. In this paper, I will respond to Accad's critique of the whole-brain criterion and defend its continued validity as a criterion for determining when a human being's death has occurred in accord with Thomistic metaphysical principles. I will, however, join Accad in criticizing Lee and Grisez's proposed defense of the whole-brain criterion as potentially leading to erroneous conclusions regarding the determination of human death.

Lay summary: Catholic physicians and bioethicists currently debate the legally accepted clinical standard for determining when a human being has died—known as the “wholebrain criterion”—which has also been morally affirmed by the Magisterium. This paper responds to physician Michel Accad's critique of the whole-brain criterion based upon St. Thomas Aquinas's metaphysical account of human nature as a union of a rational soul and a material body. I defend the whole-brain criterion from the same Thomistic philosophical perspective, while agreeing with Accad's objection to an alternative Thomistic defense of whole-brain death by philosophers Patrick Lee and Germain Grisez.

Keywords: Brain death, Thomas Aquinas, Hylomorphism, Death

INTRODUCTION

Catholic physicians and bioethicists currently debate the legally accepted clinical standard for determining when a human being has died—known as the “whole-brain criterion”—which has also been morally affirmed by the Roman Catholic Magisterium.¹ Both sides accepting that a human being is essentially a living animal with intrinsic potentialities for self-conscious rational thought and autonomous volition, the debate turns on the question of whether the irreversible cessation of the functioning of all three major

areas of the brain—cerebrum, cerebellum, and brainstem—suffice for a human being to be declared dead. Critics of the whole-brain criterion typically argue from cases of prolonged somatic survival following the cessation of total brain function to support the claim that loss of whole-brain function does not entail loss of the *integrative unity* definitive of a living human organism. Some also argue that the whole-brain criterion is not consistent with Catholic philosophical anthropology. These critics thus contend that only the irreversible cessation of respiration and circulation suffices to constitute a human being's death.² Defenders of the

whole-brain criterion question the critics' interpretation of cases of prolonged somatic survival, characterizing such cases as instead involving the persistent functioning of independent cells, tissues, and organs. Such functioning, however, lacks the degree of interdependently coordinated activity constitutive of the integrative unity essential to existing as an individual organism. Furthermore, defenders of the whole-brain criterion argue for its consistency with Catholic philosophical anthropology.³

In an article published in this same issue, Accad (2015) critiques the whole-brain criterion for determining the death of a human being from a Thomistic metaphysical perspective and, in so doing, raises objections to a particular argument defending the whole-brain criterion by Patrick Lee and Germain Grisez. In this paper, I will respond to Accad's critique of the whole-brain criterion and defend its continued validity as a criterion for determining a human being's death in accord with Thomistic metaphysical principles. I will, however, join Accad in criticizing Lee and Grisez's proposed defense of the whole-brain criterion as potentially leading to erroneous conclusions regarding the determination of human death.

HYLOMORPHISM AND INTEGRATION

Accad bases his critique of the whole-brain criterion on an interpretation of Thomas Aquinas's *hylomorphic* account of the metaphysical nature of human beings. The central thesis of the Thomistic account of human nature is that each of us is a *composite* of an immaterial rational soul informing a designated material body to be a living, sentient animal. Aquinas, following Aristotle, thus defines a human being as essentially a "rational animal" (Aquinas, ST, I, q. 76; Eberl 2004). A human being's rational soul functions as

the *formal cause* of her body's existence and functioning as a living organism, capable of sensation and locomotion, and which has a brain supportive of the soul's intrinsic capacities for self-conscious rational thought and autonomous volition. Furthermore, as its body's substantial form, a rational soul performs an essentially *unitive* function (Aquinas, SCG, bk. II, ch. 58). A rational soul is thus the formal principle of its body's existence, unified organic functioning, and specific nature as a "human" body (Aquinas, QDV, q. 13, a. 4, ad 2; Aquinas, QDSC, q. un., a. 4; Aquinas, In DA, bk. II, lect. 1). Hence, one's rational soul is the metaphysical *sine qua non* without which her body would not be a *living integrated human organism*. Following this metaphysical model, Aquinas conceptually defines a human being's death in terms of her soul ceasing to inform her body until the latter is resurrected by divine power (Aquinas, QDV, q. 13, a. 4, ad 2; Eberl 2005b, 2011, 43–71).⁴

The questions now arise of what *causes* a rational soul's union with the body it informs and what *evidence* there may be of this union. Note that asking such questions does not entail that the soul *pre-exists* its body; Aquinas (ST, I, q. 90, a. 4) explicitly denies this Platonic thesis. Neither does it imply a neo-Platonic *substance dualist* reading of Aquinas's account of human nature.⁵ Rather, these questions are aimed at discovering what necessary and sufficient conditions must be met in order for a body to be rationally ensouled and what observable signs may indicate its ensoulment. Both defenders and critics of the whole-brain criterion accept Aquinas's thesis that only a *properly disposed* body may be rationally ensouled—meaning that the body has the requisite material structures to support the actualization of the soul's definitive potentialities—and that a minimum criterion for proper disposition

is that the body be a *living integrated organism*.⁶ The central question now arises whether whole-brain function is necessary for a human body to exist as a living integrated organism suitable for rational ensoulment.

Accad begins his negative response to this question by citing Aquinas's explicit assertion that there is no other cause of the union of a rational soul and the body it informs other than the soul itself:

If, however, the soul is united to the body as its form, as we have said above, it is impossible for it to be united by means of another body. The reason of this is that a thing is one, according as it is a being. Now the form, through itself, makes a thing to be actual since it is itself essentially an act; nor does it give existence by means of something else. Wherefore the unity of a thing composed of matter and form, is by virtue of the form itself, which by reason of its very nature is united to matter as its act. Nor is there any other cause of union except the agent, which causes matter to be in act, as the Philosopher says. (Aquinas, ST, I, q. 76, a. 7)

Accad thus concludes, "the brain may not be a cause of integration of the body" (Accad 2015, 221).

Accad misconstrues, however, what Aquinas is ruling out in the cited passage and the implication therefrom of what role the brain may play in effecting bodily integration. In this article, Aquinas is indeed ruling out the thesis that there is some sort of physical *medium* by means of which a rational soul informs its body. He thus concludes in the subsequent article that the soul *immediately* informs *each part* of its body (Aquinas, ST, I, q. 76, a. 8). One of the objections Aquinas considers is that *breath* is a physical medium of the soul's informing its body

Further, a link between two things seems to be that thing the removal of which involves the cessation of their union. But when breathing ceases, the soul is separated from the body. Therefore the breath, which is a subtle body, is a means of the union between soul and body. (Aquinas, ST, I, q. 76, a. 7, obj. 2)

Aquinas denies the objector's conclusion that breath is a physical *means* by which a rational soul informs its body, but affirms that breath is a physical *sine qua non* without which soul and body would not be unified

The union of soul and body ceases at the cessation of breath, not because this is the means of the union, but because of the removal of that disposition by which the body is disposed for such a union. Nevertheless the breath is a means of moving, as the first instrument of motion. (Aquinas, ST, I, q. 76, a. 7, ad 2.)⁷

Two key points are worth noting in this brief response. First, Aquinas affirms the essential role the vital function of respiration plays in *disposing* a human body for rational ensoulment; for a rational soul's *vegetative capacities* cannot be actualized in a material body that does not have suitable organs in well-functioning order to actualize such capacities. It is this well-functioning order of a human body's organs to actualize its soul's vegetative capacities that is meant by the term "integration." Second, Aquinas identifies respiration as "the first instrument of motion." Accad would be right to emphasize that Aquinas considers the soul to be the *first principle*—i.e., the formal cause—of its body's motion—in terms of locomotion or any other movement in the classical Aristotelian sense of actualizing potentialities. This does not preclude, however, one or more of the body's material parts or activities serving as a *secondary instrumental cause* of the soul's

union with it. For such parts or activities may be necessary in effecting the body's disposition toward ensoulment—i.e., the well-ordered functioning of its various organs: its *integration*. Aquinas explicitly—if perhaps erroneously—identifies breathing as a bodily activity serving as such a cause without which a human body would not be properly disposed for rational ensoulment.

Accad admits the relevance of secondary instrumental causes that may play a role in effecting the body's integration, but then claims that the relevant cause is no *one* part of the human body, but rather the “reciprocal action of all its constitutive elements” (Accad 2015, 221). He cites as authoritative support a passage from Aristotle's *De generatione et corruptione* (1984a, bk. I, ch. 6, 322b26–7)

All things which admit of “combination” must be capable of reciprocal contact: and the same is true of any two things, of which one “acts” and the other “suffers action” in the proper sense of the terms.⁸

There are two issues with Accad's appeal to this passage and the later conclusion he draws from it. To address the latter first, Accad stresses the non-brain-mediated *communication* among the body's organs that allows them to function in a *coordinated* fashion to support the existence of the organism as a whole (Accad 2015, 221–2). Condic (2014), however, carefully differentiates “coordination” from “integration”:

Integration: The compilation of information from diverse structures and systems to generate a response that is 1) multifaceted, 2) context dependent and 3) designed to promote the continued health and function of the body as a whole. Integration is (by definition) a global response and during postnatal stages of human life, is uniquely accomplished by the nervous system, most especially, the brain.

Coordination: The ability of a stimulus, acting through a specific signaling molecule, to bring responding cells into a common action or condition. Coordination can reflect either 1) a single type of response that occurs simultaneously in multiple cells or 2) a set of synchronous, but cell-type specific responses. Coordination can be local or global and is accomplished both by the brain and by other signaling systems.

Space does not permit me to rehearse Condic's exacting analysis of how a human body's organs, absent whole-brain function, manifest coordination without integration; and I admit that Condic's analysis may ultimately fail to *demonstrate* that a whole-brain-dead human body, sustained by mechanical ventilation, lacks integration among its persistently functioning organs. Nevertheless, Condic's conceptual distinction remains valid, and there is sufficient biological evidence to support her application of this distinction to the case of whole-brain-dead individuals. The validity of this distinction between “integration” and “coordination” casts doubt on Accad's appeal to Aristotle as an equally applicable contrary thesis.

Furthermore, the passage from Aristotle says nothing that rules out the possibility of some sort of *coordinating agent* of the reciprocal causal activity among the subparts composing an integrated human body. Aristotle and Aquinas, in fact, affirm just such a coordinating agent—a “primary mover”—by means of which the rest of a body's parts move in order to actualize its soul's capacities: the heart (Aquinas, QDA, q. un., a. 9, ad 13; Aquinas, QDA, q. un., a. 10, ad 11; Aquinas, In Sent, bk. I, dist. 8, q. 5, a. 3, ad 3.).⁹ Accad is well aware of Aquinas's description of the heart as a human body's “primary organ of self-movement,” but argues that this does not support a shift to

asserting *the brain* as the body's primary organ (Accad 2015, 231).

Accad first denies the implication that the "primary organ of self-movement" is equivalent to the body's "integrator." Nevertheless, it is quite easy to construct a chain of reasoning from what has been asserted thus far, and admitted to along the way by Accad, to precisely this conclusion that he denies

1. The *formal cause* of a human body's existence as a living, sentient animal, capable of self-conscious rational thought, and autonomous volition, is its being immediately informed by a rational soul.
2. A rational soul informs only an *integrated* body, one suitably disposed toward it by possessing well-functioning organs actualizing, at minimum, the soul's vegetative capacities.¹⁰
3. Bodily integration, formally caused by the soul itself, may require certain essential secondary instrumental causes.
4. Respiration, according to Aquinas, is an essential secondary instrumental cause without which a human body is not suitable for rational ensoulment.
5. Cessation of respiration is thus a valid physical sign of a rational soul's ceasing to inform its body.
6. Respiration is an example of a human body's self-movement.¹¹
7. There may be a primary organ that functions as a first material cause of a human body's self-movement, including respiration.
8. Hence, if there is a primary organ that causes respiration, and respiration is an essential activity for bodily integration, thereby signifying a rational soul's union with its body, then the causal functioning of the primary organ is an *integrative activity* and an essential sign of rational ensoulment.

Accad would presumably agree with (1) through (7), but denies the implication of (8). I stress here that (8) is merely *implied* by the preceding propositions, not logically entailed by them. Hence, Accad is free to deny (8) without logical inconsistency; conversely, however, no reason has been proffered why (8) cannot be affirmed.

Even if Accad were to affirm (8), though, he would still deny that this leads to the conclusion that the brain-as-a-whole is a human body's primary organ. Rather, he contends that Aquinas was correct to identify the *heart* as the body's primary organ, noting its inherent capacity for self-movement even in the absence of brain function. But self-movement alone does not suffice for an organ to count as the primary organ, which Aquinas describes as that through which the soul "moves" or "operates" the body's other parts. He further characterizes it as the "ruler" of the body's other parts since it orders them as a ruler orders a city through laws (Aquinas, QDA, q. un., a. 10, ad 4; Aquinas, DMC).¹² Aquinas further cites the dependence of the body's other parts upon the primary organ, by means of which they are able to be active (Aquinas, QDA, q. un., a. 11, ad 16). I contend that the brain best fulfills the role of the primary organ insofar as it is the material source of operation for a body's vital autonomic and voluntary functions, regulates such functions and orders them to support the body's holistic-level existence and activity, and is the critical organ upon which the body's other vital organs—particularly the heart and lungs—depend for their continued well-ordered functioning.

Of course, the brain is also dependent upon the rest of the body—especially the heart and lungs—to provide oxygenated blood for it to survive and function. As Accad notes, "the brain must sense a change in oxygen content or acidity of the

blood before sending a nervous impulse to the lungs [actually the *diaphragm*] to activate a breath" (Accad 2015, 231). But whereas the brain is dependent on the rest of the body to provide *support* for its functions, the heart and lungs depend upon coordinating signals from the brain in order to function *at all* to sustain the rest of the body. Accad rightly notes that the heart muscle contracts spontaneously and has a self-regulating internal pacemaker. Nevertheless, the brain often asserts autonomic control over heart-rate in response to various stimuli and the cessation of brainstem functioning is associated with tachycardia, exemplifying a clear brain/heart relationship essential for a well-functioning, integrated, and self-sustaining human body (Tonhajzerova et al. 2012, 185–202; Novitzky, Wicomb, and Cooper 2013, 65–88). It is thus evident that the brain-as-a-whole best satisfies Aquinas's description of the primary organ—the *sine qua non* without which a developed human body is not properly disposed for rational ensoulment.¹³ Whole-brain death thus remains a valid, metaphysically sound, criterion for determining when a human being has died by focusing on *the* critical function that *efficiently integrates* a human body's various organic parts at the physical level, and thereby signifies the body's *formal integration* by virtue of the rational soul at the metaphysical level.¹⁴ It is worth emphasizing that I am not claiming that whole-brain function *causes* a human body to be informed by a rational soul, but rather that the integrative activity of the brain-as-a-whole serves as the *evidential criterion* that a rational soul is informing a living human body. Correlating neurological activity with the soul's formal integrative activity does not entail that the latter is identical with, or reducible to, the former. Furthermore, the conclusion that whole-brain function serves as evidence of rational ensoulment

in the developed human body is consistent with Aquinas's claim that the *efficient cause* of each rational soul's existence, created immediately as the form of its particular body, is God (Aquinas, ST, I, q. 90, a. 3). The material disposition of a human body does not *cause* rational ensoulment, but Aquinas is clear that God only ensouls with a rational soul a *properly disposed* human body, and that ensoulment continues only as long as the body remains properly disposed.¹⁵

LEE AND GRISEZ'S DEFENSE OF THE WHOLE-BRAIN CRITERION

In light of objections to the "brain as integrator" rationale for defending the whole-brain criterion of human death,¹⁶ Lee and Grisez (2012) have proposed an alternative rationale based upon a Thomistichylomorphic conception of human nature. Their central thesis can be formulated as follows:

1. A human being is essentially a rational animal.
2. Possessing the radical capacity for sentience is necessary in order to be an animal (rational or otherwise).
3. Irreversible cessation of whole-brain function is sufficient evidence of the entire loss of the radical capacity for sentience.
4. Therefore, the irreversible cessation of whole-brain function is sufficient evidence of the ceasing to be of an animal.
5. Therefore, the irreversible cessation of whole-brain function is sufficient evidence of the death of a rational animal, a human being.

Accad criticizes Lee and Grisez's argument by first claiming that "hylomorphism prohibits the determination of substantial

identity by means of empirical assessment of a given matter, because the matter in question is actualized by its present substantial form.” He goes on,

To say that the substantial form of the body is *necessarily* of a certain kind (“non-human”) *because* the part [i.e., the brain] has a certain property (“radically incapacitated for sentient functioning and rational thought”) gives matter more power than hylomorphism allows it to have. (Accad 2015, 227)

Accad is right insofar as matter alone has no power to determine what kind of form it has. Matter alone is what Aquinas terms “*prime matter*,” which is merely *the potential to receive form* (Aquinas, In P, bk. I, lect. 13, §118; Wippel 2000, 312–27). In actual substantial generation, however, forms do not inhere in matter without such matter being *properly disposed* to receive that specific kind of form. Hence, as noted above, a rational soul can inform only a body with the requisite sense organs to support intellectual cognition—or at least a body with the *intrinsic potentiality* to develop such organs. In human generation, sperm and ovum must combine to form a body suitable for rational ensoulment;¹⁷ otherwise, what is to stop a rational soul from informing a canine or frog embryo, or a tree or a computer for that matter? More germane to the present discussion, what is to stop a rational soul from informing the matter of a *corpse*? Accad would presumably accept that we can distinguish a corpse from a living human body even if—just after death has occurred—there is no evident structural difference between the two. The only evident difference is one of *absent function*: a corpse does not exhibit any active vegetative functions that would indicate it is still informed by at least a vegetative soul. Lee and Grisez are simply pointing toward the evident absence of a rational

soul’s active sensitive functions to indicate that it no longer informs what may still be a living human body.

And this is precisely what leads Lee and Grisez’s proposal to a conclusion they would explicitly reject: namely, that a human being who has suffered only irreversible loss of “higher-brain” function, but whose brainstem and cerebellum were intact and functional in maintaining spontaneous respiration and circulation, also no longer counts as a “rational animal.” On this construal, Terri Schiavo would have ceased to exist when she first entered a *persistent vegetative state* in 1990 from which she was unable to recover; what was sustained for the next fifteen years would have been merely a living, but non-sentient, organism.¹⁸ Furthermore, Lee and Grisez’s thesis would imply that *anencephalic* fetuses and neonates are not human beings since they too lack the rational capacity for sentience.¹⁹

Lee and Grisez’s concept of “radical capacity” echoes the Aristotelian distinction between an “active potentiality”—or “first actuality”—and the actualization of that potentiality—“second actuality” (Aquinas, ST, I, q. 48, a. 5; Aquinas, ST, I, q. 76, a. 4, ad 1; Aquinas, In DA, bk. II, lect. 2; Aquinas, QDP, q. 1, a. 1; Aquinas, QDV, q. 5, a. 8, ad 10; Eberl 2005a). They contend that a human embryo or fetus, which is not yet *actually* conscious or thinking, nevertheless possesses the *inherent radical capacity* to develop itself into an actually conscious, thinking person. Additionally, a human being may suffer a severe condition that precludes the *actualization* of her radical capacity for sentience, but the radical capacity may persist nevertheless. Hence, a human being in a comatose state, but whose brain remains sufficiently structurally intact such that she could in principle regain consciousness, retains the radical capacity for sentience and is thereby still

an animal. In more severe cases, however, involving actual *destruction* or *absence* of the neurological structures required for sentience, Lee and Grisez conclude, "If an organism has neither brain tissue nor the capacity to develop it, then it entirely lacks mammalian sentience" (Lee and Grisez 2012, 280). This is evidently the case with anencephalic fetuses and infants, as well as patients, such as Terri Schiavo, who are properly diagnosed as being in an irreversible persistent vegetative state due to irreparable damage to critical neocortical structures required for consciousness, thought, and volition.

I affirm the metaphysical foundation for Lee and Grisez's view. Hence, I do not agree with Accad's claim that we cannot epistemically infer the presence or absence of a rational soul by observing the evident functions—or evidence of the radical capacities for such functions—that are in principle actualizable in a particular human body.²⁰ There must, however, be a *minimal threshold of evidence* for a rational soul's most basic capacities being actualizable in a particular body that would allow for a *reasonable inference* that this body is indeed informed by this type of substantial form. Otherwise, it becomes theoretically possible to claim that a dog, mouse, hydrangea, or cell phone is informed by a rational soul based on mere assertion-without-evidence that it possesses radical capacities for life, sensation, and rational thought.

I disagree, however, with Lee and Grisez's claim that the radical capacity for *sentience* is the essential divisor between rationally ensouled human beings and non-human bodies. Hypothetical arguments may be formulated that take their basic metaphysical approach in either direction away from their own conclusion. In one direction, it could be argued that they mistakenly focus on the *generic* category to which human beings belong—

animal—instead of the *specific* difference between us and all other kinds of animals—rationality. Individuals in a persistent vegetative state, like Terri Schiavo, exhibit no reliable evidence of conscious awareness at any level. There are other types of patients, however, who are *minimally conscious* or who suffer *severe dementia* to the point that, while sentient at a basic level, they lack sufficient neocortical functioning to support a reasonable inference that they possess the radical capacity for rational thought.²¹

Lee and Grisez could counter with two hypothetical responses: (1) the radical capacity for rationality may still be present so long as there is a minimally conscious animal; (2) we lack sufficient epistemic certainty to conclude that such patients lack rationality. *Contra* (1), there is no more reasonable basis to infer the radical capacity for rationality in a minimally conscious individual than there is to infer the radical capacity for sentience in a whole-brain-dead individual. Both have suffered irreversible damage to critical areas of the brain supportive of, respectively, higher-order rational thought or sentience. If Lee and Grisez are going to accept one type of neural damage as indicative of the loss of a radical capacity essential to human beings (sentience), they should accept the other as reliable evidence for such a loss (in this case, rationality) as well. Unless, that is, (2) is correct; however, (2) does not rule out *in principle* the development of sufficiently precise diagnostic techniques to establish, with adequate *moral certitude*,²² irreversible damage to neocortical structures that are fundamentally critical to supporting self-conscious rational thought and autonomous volition.

In the other direction, while it is certainly unreasonable to infer the existence of a radical capacity for sentience in a corpse, a rhododendron, or a pencil, it is

not unreasonable to infer the persistence of such a capacity in a still-living human organism whose vegetative functions are intact. Lee and Grisez contend, “if the living remains [of a whole-brain dead human body] have a soul, then it is a vegetative soul, not a rational or animal soul” (Lee and Grisez 2012, 282).

I have argued previously against hylomorphic-based arguments in favor of higher-brain death based on Aquinas’s strong contention of the *unicity* of a human being’s substantial form (Eberl 2005b). As noted above, Aquinas holds that a human being’s proper capacities do not begin to exist in a developing human embryo or fetus at the same time; vegetative capacities are actualized first, then sensitive capacities, and finally rational capacities signaling the existence of a human being. Nevertheless, once a rational soul is instantiated as *the* substantial form of a human body that has developed sufficiently, it alone possesses *all* of a human being’s proper capacities: vegetative, sensitive, and rational. It is not the case that there are *three* souls informing a fully developed human body. Rather, the vegetative soul that first informs a living human embryo is annihilated once the embryo develops to the point where it has sense organs and sufficient neural development for sensitive operations; it thus becomes informed by a sensitive soul that has both sensitive and vegetative capacities. The sensitive soul is annihilated once the point is reached where neural development is sufficient to support rational activities and a rational soul is instantiated that has vegetative, sensitive, and rational capacities.²³

Aquinas thus argues at great length that a human being’s proper capacities have their source in *one* substantial form: a rational soul (Aquinas, ST, I, q. 76, aa. 3–4; Aquinas, In DA, bk. II, lect. 5; Aquinas, DUI, ch. I). Once a rational soul informs a properly disposed human body,

the body must lose its disposition for *all* of the soul’s proper capacities in order for the separation of soul and body to occur. Accepting Lee and Grisez’s interpretation entails the following metaphysical description of how human death occurs: There exists first a rational substance informed by a rational soul, and then a merely living substance informed by a vegetative soul, and then finally a lifeless corpse—and in some cases, as I have argued above, their view may allow for an in-between stage involving a sentient, but non-rational, animal informed by a sensitive soul. This description violates Ockham’s Razor, which states that *ceteris paribus* the simplest sufficient explanation of a given phenomenon—i.e., the explanation that is the least ontologically complex by requiring the postulation of the least number of entities—is the explanation to which one ought to give assent. An immediate transformation from a rational substance into a lifeless corpse upon the irreversible cessation of whole-brain function is the simplest explanation warranted.

CONCLUSION

Accad and other critics of the whole-brain criterion may cite the persistent doubts surrounding cases of prolonged somatic survival after whole-brain death to infer a lack of moral certitude regarding the currently accepted standard for determining human death. One could even imagine their petitioning the Magisterium to release an authoritative teaching modeled on the conclusion St. John Paul II drew concerning the rational ensoulment of human embryos in *Evangelium vitae*, n. 60 (de Mattei 2006, 92–5, 85–98). This hypothetical teaching could be written as follows:

Some people try to justify killing a whole-brain-dead individual in order to transplant her organs by claiming that a whole-brain-dead-individual can no longer be considered a personal human life.²⁴...Even if the presence of a spiritual soul cannot be ascertained by empirical data, the results themselves of clinical observation of whole-brain-dead individuals provide a valuable indication for discerning by the use of reason a personal presence until the moment of the last appearance of a human life...Furthermore, what is at stake is so important that, from the standpoint of moral obligation, the mere probability that a human person is involved would suffice to justify an absolutely clear prohibition of any intervention aimed at killing a whole-brain-dead individual.

The relevant question at hand is whether the presented cases of prolonged somatic survival support the “mere probability” that would morally require us to treat whole-brain-dead individuals as living human beings, even if in fact they are not. It must be emphasized, however, that such *probability* is a more stringent requirement than the mere *possibility* that Accad and those who argue from such cases against the whole-brain criterion are correct.

Furthermore, such cases do not necessarily invalidate the whole-brain criterion itself. Most cases of long-term somatic survival beyond whole-brain death involve individuals who “suffered their injuries as young children, whose systemic plasticity is greater than that of adults” (Potts 2001, 489). Given the cited cases—the oldest patient (T.K.) being twenty-four years old and pre-pubescent when he suffered whole-brain death (Repertinger et al. 2006)—it appears that the organic systems of young children, possibly up to some point around the onset of puberty, are more “plastic” than those of more mature human beings.²⁵ Perhaps the integrative functions normally carried out by the

brainstem in mature human beings can be taken on by other, normally less critical, neural structures in young children or even adolescents.

Hence, while the concept of human death is univocally understood as the loss of somatic integrative unity in all cases, the criteria for determining when such loss has occurred may differ depending on what primary organ fulfills the requisite integrative functioning. In cases of young children or adolescents, the circulatory/respiratory criterion may be more appropriate for a proper diagnosis of death to meet the standard of moral certitude. In the case of mature human beings, though, the whole-brain criterion has not been invalidated and the cessation of mechanical ventilation or explantation of vital organs would not be morally tantamount to “killing” by either omission or action.

ENDNOTES

1. The whole-brain criterion was legally affirmed in the US by the Uniform Determination of Death Act, which was defined by the President’s Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (1981), subsequently adopted by all 50 states, and defended the President’s Council on Bioethics (2008) appointed by George W. Bush. The whole-brain criterion has also been affirmed by the Vatican in two working group reports (White, Angstwurm, and Carrasco de Paula 1992; Sánchez Sorondo 2007).
2. See n. 16 for references to some of the key critics of the whole-brain criterion.
3. In addition to others cited in this paper, Catholic defenders of the whole-brain criterion include Smith (1990a, 1990b, 1990c), Furton (2002), Ashley and O’Rourke (1997, 316–37), Ashley (2001), Napier (2009). The primary non-Catholic defender of the whole-brain criterion is

- James Bernat: see Bernat, Culver, and Gert (1981), Bernat (1998; 2002; 2008, ch. 11).
4. For elucidation of Aquinas's account of bodily resurrection, see Eberl (2000).
 5. For a comparative analysis of Thomistic hylomorphism and Platonic dualism in both classical and contemporary forms, see Eberl (2010).
 6. Other necessary criteria include the body possessing, or at least having the intrinsic potentiality to develop, sophisticated sense organs and a cognitive architecture supportive of rational thought (Aquinas, ST, I, q. 76, a. 5).
 7. Writing in the thirteenth century, Aquinas is obviously unaware of the implications of his view with respect to individuals who may be dependent on mechanical ventilation. It is certainly not the case that a patient who has suffered a high cervical cord transection and is thereby dependent on mechanical ventilation is "dead" just because he cannot breathe spontaneously. I discuss such cases and the implications thereof for the whole-brain criterion in Eberl (2011, 43–71).
 8. As translated and quoted by Accad. Unfortunately, we do not have an authentic commentary by Aquinas on this chapter of *De generatione et corruptione*; rather, an unknown author wrote the remainder of the Thomistic commentary that has been handed down (Torrell 1996, 235).
 9. For elucidation of Aristotle's claim that the heart functions as the body's primary organ, see Spencer (2010, 860–2).
 10. Note that this does not imply that bodily integration occurs *prior* to the soul's informing the body. Rather, this principle follows Aquinas's reasoning in ST, I, q. 76, a. 5, where he discusses what type of body is "proper" for rational ensoulment. The proper bodily condition(s) for ensoulment and the body's ensoulment occur *concomitantly*.
 11. Accad (2015) affirms this claim on p. 231.
 12. This does not mean that the primary organ is the *efficient cause* of the activity of the body's other organs, aside from voluntary muscle movement. First of all, such a relationship has been disproved in modern medicine, as well as in the times of both Aquinas and his predecessor Aristotle; see the quotation from Aristotle's *De motu animalium* (1984b) included in the objection to which Aquinas is replying in the citation here from QDA. Furthermore, Aristotle's description of the primary organ as the body's ruler—and the political analogy he employs—does not imply "micromanagement" of the body's functions; rather, the primary organ providing the *means*—oxygenated blood—by which the body's other parts may function.
 13. Note that this conclusion applies only to the *developed* human body with a functioning brain integrating its vital functions. It does not preclude the possibility of rational ensoulment *prior* to the brain's development in a human fetus insofar as integration of the developmentally immature human embryo and early-term fetus can be effected by non-brain-mediated causal mechanisms. Once the brain develops and begins to regulate circulatory/respiratory activity, it *then* becomes the vital material component instrumentally facilitating the soul's integration of its body. For further discussion of this asymmetry in the material requirements for rational ensoulment, in which the whole-brain criterion is defended along with immediate ensoulment upon conception of a human embryo, see Eberl and Brown (2011, 43–65).
 14. Augustine also recognizes the intimate relationship between a human being's soul and brain, concluding that, when the brain's functions "fail totally," the soul "takes it departure, as having no reason why it should linger" (Augustine 2002, bk. VII, §19, p. 336).
 15. As noted above, the proper disposition required for God's rational ensoulment of a human body does not depend upon brain-mediated integration *ab initio*, as other secondary instrumental causes suffice for the physical integration of human embryos and early-term fetuses.
 16. The most vociferous objector to the "brain as integrator" rationale is Shewmon (1997; 1998a; 1998b; 1999; 2001; 2004, 23–41; 2006, 211–50; 2009). See also the writings of Byrne and colleagues (Byrne and Weaver 2004, 43–9; Potts, Byrne, and Nilges 2000; Byrne and Rinkowski 1999; Byrne et al. 1997; Byrne and Nilges 1993; Byrne, O'Reilly, and Quay 1979). For additional arguments supportive of

- Shewmon's view from within a Thomistic hylomorphic framework, see Seifert (2006, 189–210; 2000; 1993).
17. Aquinas does not hold that rational ensoulment occurs immediately upon conception, but rather that the embryo must go through a *graduated process* in which it first exists as a simple organism—informed by a vegetative soul—then later a rudimentarily sentient animal—informed by a sensitive soul—before finally developing the requisite organs to engage in a level of sensation sufficiently supportive of rational thought (Aquinas, ST, I, q. 76, a. 3, ad 3; Aquinas, ST, I, q. 118, a. 2, ad 2; Aquinas, QDA, q. un, a. 11, ad 1; Aquinas, SCG, bk. II, ch. 89; Aquinas, QDSC, q. un., a. 3 ad 13; Aquinas, QDP, q. 3, a. 9, ad 9; Aquinas, CT, ch. 92). Departing from Aquinas's explicit thesis, contemporary Thomists—including the present author—have by-and-large affirmed that a human embryo, upon conception, is sufficiently organized due to its genetic and structural identity to be rationally ensouled. See Eberl (2009, 317–38), Eberl (2006, ch. 2), Vélez (2005), Austriaco (2004), Haldane and Lee (2003), Ashley and Moraczewski (2001), Ashley (1976). Despite disavowing Aquinas's explicitly held thesis of “delayed animation,” Thomists who affirm “immediate animation” of a human zygote by a rational soul nevertheless affirm the basic metaphysical principle that a rational soul can only inform a *suitably organized* material body. They simply contend that a human zygote is so organized due to its possessing the intrinsic potentiality to develop the requisite organs to support intellectual cognition.
 18. Lee (2014) is aware of this implication and attempts to avoid it by pointing to the “reasonable doubt” that may exist whether a PVS patient would have been able to recover if provided appropriate treatment, as well as the potential for “misdiagnosis” of PVS. Nevertheless, these are *practical* issues that do not rule out *in principle* the implication of his and Grisez's view that a *properly diagnosed* PVS patient, with evident irreversible dysfunction or structural deterioration of relevant critical areas of the neocortex, would no longer be a human being.
 19. Even if the anencephaly were not congenital—due to a genetic defect at the point of conception—but rather was due, as is typically the case, from an environmental deficiency—such as lack of folic acid in the mother's diet—Lee and Grisez would be compelled to conclude what was initially a human being had ceased to be so at some point during gestation. See Copp and Greene (2013).
 20. The “in principle” clause allows for such radical capacities to be present even if their actualization is inhibited by certain material conditions of the body or its environment.
 21. I am not claiming that patients in a minimally conscious or severely demented state *altogether* lack neocortical activity, but rather that such activity may not evidentially support the presence of the specifically human activities of self-conscious rational thought and autonomous volition, even at a minimal level. For extensive research on the relation of neocortical activity to various disorders of consciousness, see the voluminous research by Steven Laureys and colleagues listed at http://www.coma.ulg.ac.be/papers/coma_vegetative_state.html. Of course, inferring the presence or absence of mental states such as self-consciousness based on observable criteria is epistemically dangerous; and so Lee and Grisez are right to adhere to the more strict criterion of loss of total brain function as indicative of the loss of the radical capacity for sentience altogether. Nevertheless, such a pragmatic conclusion does not rule out *in principle* the possibility of there being individuals who suffer sufficient neocortical infarction such that they are no longer *rational* animals according to Lee and Grisez's overall thesis.
 22. For elucidation of the concept of “moral (or prudential) certitude,” see Aquinas, ST, I–II, q. 96, a. 1, ad 3; Aquinas, ST, II–II, q. 47, a. 9, ad 2; Haas (2011).
 23. To be clear, I am not advocating Aquinas's graduated description of delayed hominization, for reasons noted in n. 17. I am merely illustrating Aquinas's thesis that, despite the graduated animation process, the final substantial form of a human being possesses the definitive capacities of the lower types of soul and

thus a human being is *unified* in her existence as a living, sentient, and rational animal.

24. Spaemann (2011, 329) raises the concern that the demand for vital organs for transplantation is a driving motivation for supporters of the whole-brain criterion. This *ad hominem* critique, regardless of whether it is accurate, does not invalidate metaphysical arguments in support of the whole-brain criterion provided they are otherwise based upon sound principles. This has been an ongoing concern about the brain-death criterion since its initial development in 1968 by the Harvard Ad Hoc Committee on Brain Death. For a counterpoint analysis, see Machado et al. (2007).
25. Shewmon (1998b, 1543) notes that an “age factor” was present among the cases he analyzed.

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