DEFINING DEATH: A CALL FOR THE REFORMATION OF THE STANDARD FOR DECLARATION OF DEATH IN THE MODERN ERA

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I. INTRODUCTION AND BRIEF HISTORY

“I’m not living the life I thought I would lead, but it does have meaning, purpose. There is love...there is joy...there is laughter.”
~ Christopher Reeve

Questions about the meaning and definition of death have been an abundant source of philosophical and religious contemplation for centuries, giving rise to countless different perspectives.¹ Many religions view death as a temporary, rather than permanent,

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state whether it be a transitory stage, such as is believed in Buddhism; a reoccurring, and thus insignificant, event, believed in Hinduism; or a pathway to final judgment, such as in Islam. Judeo-Christian sects view death with somewhat more finality leading to an afterlife as opposed to a rebirth on earth. And still others view death as even more final, resulting in neither an afterlife nor a rebirth.

In spite of these varying perspectives on the role death plays in the overall scheme of life, declaration of whether or not death had occurred was, prior to the mid 20th century, a relatively definite determination. The person would stop breathing, their body would become cold and rigid, and decay and decomposition would commence. The loss of respiratory or circulatory function inevitably led to loss of all cognitive ability and vice versa. Thus, because the functioning of each vital organ was inextricably linked to the others, the loss of one inevitably resulted in the loss of all others and, eventually, the death of the individual as a whole.

With the advent of the positive-pressure mechanical ventilator in the 1950s came the loss of integration among these organ systems. The ventilator allows patients who have suffered massive, irreversible brain damage to be kept alive metabolically by

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2 Id.
3 Id.
6 James Bernat, There Can Be Agreement as to What Constitutes Death, Contemporary Debates in Bioethics, 377 (2012)
7 Bernat, note 5 supra, at 377
maintaining respiratory and, thus, circulatory function, albeit artificially.\(^8\) As a result, technological developments that can support the functioning of some component parts, but not others, have rendered the traditional view of death – death of the organism as a whole evidenced by the loss of all major organ function – utterly ambiguous since part of the organism has the appearance of life while other parts appear to be dead.\(^9\)

A ventilator pushes air into the lungs usually up to a preset volume.\(^10\) Once that volume is reached, the ventilator breath terminates, and the “elastic recoil of the chest accomplishes passive exhalation by pushing the tidal volume out.”\(^11\) In this way, the ventilator provides respiratory function, which in turn fuels the circulatory system.\(^12\) Aside from the brain, the circulation of oxygenated blood to organs allows them to function essentially as they would absent brain injury.\(^13\) However, the individual is entirely incapable of maintaining this kind of functioning without mechanical support, and often lacks substantial conscious awareness.\(^14\) In this way, such modern resuscitative and supportive measures “can restore ‘life’ as judged by the ancient standards of persistent respiration and continuing heart beat” even absent the most remote possibility of the patient ever regaining consciousness following massive brain damage.\(^15\)

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\(^8\) Id at 377-78
\(^9\) Id at 378. As Bernat explains, a person who is brain dead on a ventilator has an autonomous heartbeat that circulates oxygenated blood, which allows all other organs except for the brain to function. The brain cannot regain function even with the artificial support of the respiratory and circulatory systems.
\(^10\) http://emedicine.medscape.com/article/304068-overview
\(^11\) Id.
\(^12\) Bernat, note 5 supra, at 378
\(^13\) Id.
\(^14\) Id.
\(^15\) Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death, A Definition of Irreversible Coma, 339 (1968)
The ability to maintain some functioning of a patient with massive brain damage as well as other medical advances such as the ability to successfully transplant viable organs have given rise to a host of legal issues revolving around the question of the definition and determination of death. The main issue that arises from this situation is two-fold. On the one side, such medical technology can prolong an individual’s life even as his or her brain and body deteriorates and when there is virtually no chance of recovery. One the other side, there are people taken off life sustaining treatment who could have regained a higher level of functioning, even if not a full recovery.

Part II of this paper will discuss these legal issues. Part III will explore the strengths and shortcomings of various standards for determining death that have been put forth thus far. Part IV will review the current state of the law regarding the definition of death. Finally, Part V offers a proposal that will embrace both preservation of life and individual autonomy by resolving many legal issues while respecting the dignity of the human person. Specifically, this part proposes a comprehensive legal definition of death that will promote consistency and trust in both the legal and medical professions and calls for acceptance of a more realistic view of withdrawal of treatment as well as reform for and stronger utilization of advance directives.

II. LEGAL ISSUES INVOLVING THE DECLARATION OF DEATH

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16 The line of argument using organ transplantation as justification for an earlier determination of death will likely become obsolete at some point in the future as regenerative medicine progresses, allowing organs to be repaired using such things as stem cells (MITEF Discussion Panel – The Future of Regenerative Medicine – Advances in Research and Commercialization, April 16, 2014)

17 Among these medical advancements Friedland includes the advent of antibiotics
In 1967, Dr. Christian Bernard performed the first heart transplant in South Africa.\(^\text{18}\) This life-saving advancement in medicine gave rise to the question of whether the donor was in fact dead or alive, for if the donor’s heart could be restarted in somebody else, had the donor really met the definition of death as the irreversible cessation of all major organ function?\(^\text{19}\) It also gave rise to the need to pinpoint death to a particular time.\(^\text{20}\) The tension between the need for certainty grounded in the natural hesitation to procure organs from patients who are not officially dead and the need to procure organs early enough such that they were viable for transplant grew as the demand for organs and the success rate of transplantation due to improvements in immunosuppressant drugs increased.\(^\text{21}\)

The demand for viable organs, as well as the 1968 Harvard Medical School ad hoc committee’s push for adoption of brain-death criteria,\(^\text{22}\) became major driving forces behind the desire to clarify the definition of death because the longer an organ goes without oxygenated blood supply, the less likely it will be usable.\(^\text{23}\)

However, current controversy over the brain-death standard indicates a need for even further clarification of the definition of death.\(^\text{24}\) This need is even more urgent in


\(^{19}\) Bernat, note 5 supra

\(^{20}\) Id.

\(^{21}\) Fry-Revere, note 4 supra, at 7-8 stating “In particular, the discovery of cyclosporine in 1978 greatly increased the survival rate of transplant recipients and made the expanded use of cadaver organs feasible. The procurement of cadaver organs, however, was complicated by the need to do so with limited delay. The longer the donor was dead, or rather the longer the organs were without oxygenated blood supply, the less likely it was that retrieved organs would be viable for transplant. As the science and practice of transplantation and organ preservation techniques improved, the demand for organs surged. As the demand for organs increased, so did the push to clarify the definition of death to allow for expeditious organ retrieval.”

\(^{22}\) Ad Hoc Committee of the Harvard Medical School, note 15 supra, at 339

\(^{23}\) Fry-Revere, note 4 supra, at 7-8

\(^{24}\) See Id. at 38-43
light of a growing lack of trust in healthcare professionals. People hesitate to designate themselves as an organ donor due to the perception that healthcare professionals are motivated “to give up on…[such] patients sooner than patients or their families would like,” presenting a major obstacle to the organ transplant community and those in need of viable organs.

How the law defines death has further implications regarding such things as when medical professionals can legally withdraw, or even refuse life sustaining, but futile, efforts; the transfer of property; changing of a survivor’s marital status; and death behaviors such as grieving and burial or cremation arrangements.

Legal issues regarding the ability to discontinue life-sustaining treatment implicate perhaps the most pressing concern driving the need for a modification of the definition of death – preservation of human dignity. The argument is two-fold. On the one hand, medical advances can extend the final stages of terminal illness, “maintain human life in a persistent vegetative state with no hope of recovery,” and even keep the body metabolically alive in the absence of any brain function whatsoever. Maintaining life in a “near-death state” comes at a high cost, both financially and emotionally, and elicits the question of what is more important – “lingering life” or death with dignity?

Not only can spending valuable hospital resources on patients with absolutely no chance

25 Id at 57
26 Id at 58-59 (one survey found that at least 25 percent of those surveyed “expressed fears that if they signed a donor card…physicians would do less to save their lives” (quoting J. M. DuBois, Increasing Rates of Organ Donation: Exploring the Institute of Medicine’s Boldest Recommendation, 20 J. Clinical Ethics 13, 19 (2009)))
27 Friedland, note 1 supra, at 99
28 Id.
of recovery seem wasteful,\textsuperscript{29} maintaining a patient in such a state, and in compliance with the current law, all too often defies our basic notions of life with dignity.\textsuperscript{30}

To illustrate this point, take the case of Nancy Cruzan. In 1983 Nancy was discovered lying face down in a ditch after her vehicle had overturned and with substantial brain damage due to “probable cerebral contusions compounded by significant anoxia (lack of oxygen).”\textsuperscript{31} Permanent brain damage can result after only 6 minutes without oxygen, and Nancy had been deprived of oxygen for approximately 12-14 minutes.\textsuperscript{32} After considerable rehabilitative efforts, Nancy ultimately progressed into a persistent vegetative state – “a condition in which a person exhibits motor reflexes but evinces no indications of significant cognitive function.”\textsuperscript{33}

When it became apparent that Nancy had no chance of recovery, her parents insisted that hospital employees discontinue any “death prolonging procedures,” namely artificial feeding and hydration tubes.\textsuperscript{34} The Supreme Court of Missouri denied approval to withdraw such treatment on the basis that Nancy’s parents had not met the demanding standard of “clear and convincing evidence” in regards to Nancy’s desire to live or die under certain conditions.\textsuperscript{35} The Supreme Court of the United States affirmed. Reasoning that the State’s interest in preserving life justifies the strict standard, the Court asserted that, although “no person or court should substitute its judgment as to what would be an acceptable quality of life for another…the inquiry must always be narrowed to the

\textsuperscript{29} Fry-Revere, note 4 \textit{supra}, at 9
\textsuperscript{30} See Friedland, note 1 \textit{supra}, at 111, where he discusses the state in which Nancy Cruzan “lived”
\textsuperscript{31} \textit{Cruzan v. Director, Missouri Department of Health}, 497 U.S. 261, 266 (1990)
\textsuperscript{32} \textit{Id.}
\textsuperscript{33} \textit{Id.}
\textsuperscript{34} \textit{Id.} at 267
\textsuperscript{35} \textit{Id.} at 268
patient’s expressed intent, with every effort made to minimize the opportunity for error.”

While the Court’s efforts have every appearance of being noble,

In reality, Nancy lay in a bed, contorted with irreversible muscular and tendon damage, her hands bent so far over that her fingernails pressed into her wrists. She stared with unseeing eyes, oblivious to her environment, unable to drink or eat. She was fed through a tube in her side; another tube carried away waste. *Her brain was atrophying, replaced by a pool of cerebrospinal fluid.* (Emphasis added).

Nancy possibly could have remained in this condition for as long as 30 years. But she most likely would have never recovered, never regained her cognitive faculties, never walked or talked or experienced spending time with loved ones again.

Recently, a Texas woman who met the criteria for brain death after being found unconscious on her kitchen floor at 14-weeks pregnant was maintained, against her and her family’s wishes, on life support pursuant to the Texas advance directives act regarding pregnant patients. The statute states, “A person may not withdraw or withhold life-sustaining treatment under this subchapter from a pregnant patient,” and it does not differentiate between patients who are dead versus near dead. The situation gave rise to a “wrenching legal debate about who is alive, who is dead, and how the presence of a fetus changes the equation.” In his affidavit to the court nearly 2 months later, the

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36 *Id.* at 275
37 Friedland, note 1 *supra,* at 111
38 *Id.*
39 See *Cruzan,* note 30 *supra,* at 267; and Friedland, note 1 *supra,* at 111
42 Lavandera, note 39 *supra*
husband said that his wife was barely recognizable, her bones would crack when her limbs moved, she smelled of death, “and her once lively eyes [had] become ‘soulless.’”

In his first amended motion to compel the hospital to remove his wife from “life-sustaining treatment,” the husband argued that because his wife was dead under Texas law she could not be a “pregnant patient” nor receive life sustaining treatment since “no treatment can possibly sustain [her] life;” thus the hospital would not in fact be withdrawing life sustaining treatment. By the time the life-support was removed, the fetus was severely damaged. These are only two examples of the “far-reaching adverse consequences” of modern medical advancements that prolong not life, but death.

On the other side, there are numerous cases of people who were, or were thought to be, in a persistent vegetative state who have regained a higher level of functioning and many of those in a vegetative state who are taken off life-sustaining treatment would have potentially regained a higher level of functioning. Moreover, it is not entirely clear whether a person in a persistent vegetative state has lost all consciousness as previously thought.

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43 Id.
45 Plaintiff’s First Amended Motion to Compel Defendants to Remove Marlise Munoz From “Life Sustaining” Measures and Application for Unopposed Expedited Relief, 2014 WL 285054 (Tex. Dist.–Tarrant County 2014)
46 NBC News, Brain-Dead Pregnant Woman to be Laid to Rest After Being Disconnect from Life Support, www.usnew.nbcnews.com (1/26/2014)
47 Friedland, note 1 supra, at 111 (“The advances in modern medicine have had significant and far-reaching adverse consequences…Scientific advances, by affecting the nature and location of death and even its definition, have unrealistically expanded society’s expectations relating to longevity.”)
48 Interview with Dr. Sherer (March 2014)
A persistent vegetative state (VS) has traditionally been categorized as a “condition of complete unawareness of the self and the environment.”\(^{49}\) However, recent research “suggests that some patients in VS may be able to follow instructions [to perform complex tasks] leading to a pattern of brain activity that can be observed by fMRI, or functional magnetic resonance imaging.”\(^{50}\) For example, Professor Adrian Owen found characteristic changes in the brain scans of two VS patients indicating cognitive processes taking place after instructing the patients to imagine playing tennis.\(^{51}\) Both of these patients improved to meet the criteria for minimally conscious state.\(^{52}\)

This and other research has shown that “some people can look like they’re vegetative, but still have awareness inside their head.”\(^{53}\) Scott Routley, a participant in one of Owen’s brain-imaging initiatives entered what doctors thought to be a vegetative state after a car accident resulting in severe damage to both hemispheres of his brain. Owen has developed a way to allow certain patients to communicate “yes” and “no” answers to questions by imagining walking through the patient’s home and playing tennis, respectively, while in a fMRI machine. Using this method, Owen was able to ask

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\(^{50}\) Loano Skene et al., *Neuroimaging and the Withdrawal of Life-Sustaining Treatment from Patients in Vegetative State*, Medical Law Review 17 (2) (2009)

\(^{51}\) *Id.* (For this study, Owen instructed 17 patients diagnosed as being in a vegetative state or a minimally conscious state to imaging that they were playing tennis, moving their arms, moving from one room to another, or driving home from work. These images were intended to detect two types of cognitive processes – motor imagery and spatial navigation. Both patients who exhibited changes in brain activity had been diagnosed as being in a vegetative state.)

\(^{52}\) *Id.* (Those in a minimally conscious state “inconsistently manifest[] behavioral responses to stimuli.”)

\(^{53}\) Sydney Lupkin, *Man in Supposed Vegetative State Communicates*, ABC News Online (Nov. 14, 2012) (quoting Dr. Bryan Young, a neurologist at University Hospital in London, Ontario)
Routley, after nearly 12 years of being in such a state, whether we was in pain, to which Routley answered “no” by imagining he was playing tennis.  

This illuminates the dilemma of whether or not it is ethical to withdraw life-sustaining treatment from patients who can potentially interact, even minimally, with the world around them such as Scott Routley, regardless of cost or the need for organs for transplant. It also begs the question of whether advances in neuroimaging can lead to the ability to determine with better specificity who is likely to regain higher levels of functioning. Furthermore, it could be possible that with proper treatment a good number of those previously neglected due to their diagnosis could actually improve.

III. STANDARDS FOR DETERMINING DEATH

The inquiry into the definition of death consists of two overarching questions – the ontological question of “what is human death,” and the epistemological question of “how can we determine that death has occurred”? The answer to the first question generally falls into one of two categories: biological or metaphysical. Biological definitions of death include the irreversible cessation of organismic functioning, meaning the loss of spontaneous organ function. Metaphysical definitions refer to more abstract concepts such as the irreversible loss of personhood or the irreversible loss of the essence of being human. Still others argue that the definition of death is a moral issue, the determination of which depends on at what point it is appropriate to commence “death

54 Id.
55 DeGrazia, note 6 supra
56 Id.; see also Winston Chiong, There Cannot be Agreement as to What Constitutes Human Death, Contemporary Debates in Bioethics, 389 (2012)
57 DeGrazia, note 6 supra; c.f. Chiong, note 55 supra, at 389 (Chiong rejects metaphysical definitions of death noting that it could potentially support the notion that a person with advanced dementia is “dead” even though their body is alive because their personhood is dead)
behaviors,” such as discontinuation of life support efforts, initiation of organ procurement and/or burial or cremation arrangements, grieving, change of survivor’s marital status, and the transfer of property.  

While scholars disagree about the ability to define death, the significance of defining it, and the definition itself, “standards for the bedside determination of death have been firmly settled within the medical community.” The following sections will explore the strengths and weaknesses of the two widely accepted standards of cardiopulmonary death and brain death, as well as contemporary alternatives.

A. Irreversible Cessation of Cardio-Respiratory Function and Permanent Cessation of Cardio-Respiratory Function

The traditional standard for determining when a person had died is the irreversible cessation of autonomous heartbeat and lung function, or cardio-respiratory function. A common standard applied by emergency medical teams with an adult heart attack victim if no physician is available to advise consists of the administration of CPR with no resuscitation for 30 minutes. Hospital policies generally permit a declaration of death if heart and lung function do not auto-resuscitate within 2-5 minutes after resuscitative efforts cease. However, many factors such as age, general health, and the length of time the victim went without a sustained heartbeat and before receiving emergency care affect

58 DeGrazia, note 6 supra (The definition of death as a moral issue is generally associated with the irreversible loss of the capacity of consciousness)
59 Bernat, note 5 supra, at 378
60 Cardiorespiratory death may also be referred to as cardiopulmonary death or cardiac death
61 Fry-Revere, note 4 supra, at 39-40
62 For example, the UTMB policy states as their circulatory-respiratory criteria, “patient is pulseless, apneic, and unresponsive to verbal stimuli for a period of at least 2-5 minutes”
whether circulatory function can be restored, making it difficult to come up with an exact length of time after which cessation should be considered irreversible.\footnote{Id. at 40}

Take the story of Li Xiufeng, for example.

In the spring of 2012, in the town of Beiliu, China, a 95-year-old woman named Li Xiufeng was discovered by her neighbor one morning in bed showing no signs of breathing or a heartbeat. She was placed in a coffin in the den of her home so that friends and relatives could pay their respects for the next week, as is Chinese custom. Six days later, the day before her funeral, neighbors returned to Li’s home to prepare her body for the funeral. What they discovered was an empty coffin – the lid overturned and lying on the floor – and Li preparing dinner in her kitchen!\footnote{Arthur L. Caplan and Robert Arp, \textit{Can There Be Agreement as to What Constitutes Human Death?}, Contemporary Debates in Bioethics, 369 (2014)}

This incident occurred two weeks after Li had tripped and suffered a head injury in her home.\footnote{Natalie Evans, \url{http://www.mirror.co.uk/news/weird-news/zombie-gran-95-year-old-chinese-woman-746295} (2012)} The neighbor attempted to wake her, but “no matter how hard [he] pushed her and called her name, she had no reactions.”\footnote{Id. (quoting Chen Qingwang, the man who discovered Li Xiufeng)} Although Li’s heart and lungs appeared to cease functioning, she clearly was not dead.\footnote{Caplan and Arp, note 62 supra, at 370} We can make at least two speculations as to why this occurred: (1) her heartbeat and breathing had not actually stopped completely, but were merely undetectable; and (2) her heartbeat and breathing did stop or slow down for some time, but her brain and other parts of her body kept her alive in a quasi-sleep.\footnote{Id.} Li’s heart and lungs stopped long enough for friends and family to consider her dead, even though she clearly was not. This illustrates one concern regarding the traditional standard – what it takes for the loss of such function to truly be, and our ability to determine whether or not it is, irreversible.

\footnote{Id. at 40}
Another potentially unsettling problem regarding irreversibility of heart and lung function arises in the context of organ donation. The point of any standard for death is to determine at which point the person as a whole has been irreversibly lost. However, organs from an individual who has supposedly irreversibly lost function of such organs can be restarted in another person. If these organs can be restarted in someone else, they themselves have not irreversibly ceased to function. And if such organs can be restarted in another person, why can they not be restarted in the person from whom they came? Perhaps that person has met the criteria for brain death, or perhaps peripheral systems are sufficiently damaged such that they can no longer support functions of vital organs. Perhaps it was not entirely clear that the patient was in fact dead. As Fry-Revere points out a “common misconception is that emergency support will not be withdrawn until it is clear that the patient is in fact dead, not just when the medical team feels reasonably sure that the patient will die despite their best efforts.”

The problem is further complicated when the patient has not met brain death criteria, but cardiorespiratory function can be sustained only with the assistance of resuscitative efforts. Suppose further that the patient cannot be saved, i.e., there is no reasonable medical probability of recovery. If resuscitative efforts are stopped, is that person dead? Is that person dying? Most of us would be hard pressed to declare that person dead just yet (remember, much cognitive function is still intact). After the resuscitative efforts have been stopped, electrical activity in the brain will start to cease.

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69 Fry Revere, note 4 supra, at 40
70 Id.
71 Id.
72 For this hypothetical see Fry-Revere, note 4 supra, at 41
after only 10 seconds. However, it may take up to 10 minutes for brains cells to start to
die, and it will take approximately 15-20 minutes of such anoxia to the brain to halt
higher brain function and even longer for whole brain death to occur (recall that a person
can be declared dead after only 2-5 minutes). By this point the individual’s organs will
no longer be suitable for transplant due to systemic cell death in the body. For example,
the heart is virtually worthless for transplantation purposes if it is not removed from the
patient within ten minutes after oxygenation ceases. This dilemma may be largely
alleviated if the patient wishes to be removed from life sustaining treatment and has
consented to organ donation. However, in this type of situation are we prepared to say
that the person is dead at the time organ procurement would begin?

Bernat refers to this situation as permanent, rather than irreversible, cessation of
cardio-respiratory function. Permanent cessation means that cardiorespiratory function
“will not return because it will neither return spontaneously nor be restored through
resuscitative technology.” The stricter standard of irreversible means that
cardiorespiratory function “cannot return using current technology” (emphasis added).
The use of this definition for “permanent” allows a determination of death earlier on than
this definition for “irreversible.”

These types of complex situations have caused a shift from the traditional cardio-
respiratory standard to the whole-brain death standard. For while “there may be little or

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73 Caplan and Arp, note 62 supra, at 370
74 Id.
75 Id. at 41
76 Id. at 370
77 Id.
78 Bernat, note 5 supra
79 Id.
80 Id.
81 Id.
no discernable cardiopulmonary functioning…the brain may still” function, and the body can be sustained with the “assistance of ventilating machines that maintain cardiopulmonary functioning.”82 Furthermore, while we must be mindful to not prolong a patient’s inevitable deterioration and demise, there are many cases in which people on ventilators and feeding tubes for extended periods of time have “woken up” with many psychological states and capabilities intact.83 Others criticize the cardiorespiratory standard as a reductionist approach that “obscures the holistic nature of bodily functioning” because it asserts that the “difference between life and death comes down to the state of just two organs.”84

Despite its shortcomings, many support the cardiorespiratory standard reasoning that a human body that is breathing and maintaining circulation is alive regardless of whether these function are spontaneous or aided by life support measures.85 The updated traditional approach goes even further, explaining that integrative unity is not an exclusive function of the brain, but exists diffusely throughout the organism.86 The “functioning of other organs and bodily systems [are not] passively dependent on the brain,” but rather “the brain’s capacity to augment other systems presupposes their preexisting capacity to function.”87 Furthermore, it may better handle cases that brain standards handle less plausibly, such as prenatal beings before brain development,
patients with disorders of altered conscious (e.g., vegetative state), and brain dead patients on life support.\footnote{Id.}

B. “Brain Death,” i.e., Irreversible Loss of Brain Function

The most common causes of brain death include direct trauma to the head, massive hemorrhaging due to aneurysm, and lack of adequate oxygen due to cardiac or respiratory failure.\footnote{Weyrauch, note 17 supra, at 94} Other causes include massive brain damage, neoplastic or vascular intracranial lesions, and encephalopathic states such as metabolic derangements associated with uremia.\footnote{Report of the Ad Hoc Committee Report, note 15 supra, at 338} All of these conditions lead to hypoxia (lack of oxygen) and/or ischemia (lack of blood flow) to the brain and can result in some form of brain death.\footnote{Uremia “occurs when…waste products build up in the body because the kidneys are unable to eliminate them” due to chronic kidney disease or acute renal failure. Uremia can lead to coma. (http://www.webmd.com/a-to-z-guides/uremic-syndrome, WebMD, LLC (2005-2014))}

There are currently three brain death approaches – whole-brain death; neocortical, or higher-brain, death; and brainstem, or lower-brain, death – each with criteria relating to different parts of the brain. The human brain is essentially divided into three parts: the hindbrain, which is oldest part of the brain and includes the medulla, pons, and cerebellum; the midbrain; and the forebrain, which includes the cerebrum.

The brainstem, the part of the brain that ceases to function in both whole-brain death and brainstem death, consists of the medulla, the pons, the reticular formation, and the midbrain. The midbrain controls posture and walking and handles eye movement reflexes. The medulla controls autonomic functions, such as breathing and heart rate. The

\begin{footnotesize}
\begin{enumerate}
\item \footnote{Id.}
\item \footnote{Weyrauch, note 17 supra, at 94}
\item \footnote{Report of the Ad Hoc Committee Report, note 15 supra, at 338}
\item \footnote{Uremia “occurs when…waste products build up in the body because the kidneys are unable to eliminate them” due to chronic kidney disease or acute renal failure. Uremia can lead to coma. (http://www.webmd.com/a-to-z-guides/uremic-syndrome, WebMD, LLC (2005-2014))}
\item \footnote{Report of the Ad Hoc Committee Report, note 15 supra, at 338}
\end{enumerate}
\end{footnotesize}
pons is involved in auditory and vestibular functions, sensory and motor functions, and plays a role in both breathing and the sleep-wake cycle. The reticular formation controls arousal.  

The forebrain houses the parts of the brain involved in higher brain functions such as emotion processing, memory, homeostasis, regulation of movement, planning and execution of movement, perception of sensation, executive function, and consciousness. Various areas in the forebrain may be damaged in a person in a vegetative state. Higher brain death generally refers to the loss of function of the neocortex, the very outer layer of the brain. The neocortex accounts for about 76% of the brain’s volume in humans.

1. Whole Brain Death, i.e., Irreversible Cessation of Most Brain Function

The whole-brain death standard is the most widely accepted standard among medical associations and jurisdictions. Under this standard, death occurs upon the irreversible cessation of the functioning of, theoretically, the entire brain. Thus, a person who meets the criteria for whole-brain death exhibits “total unawareness to externally applied stimuli and inner need,” is unable to engage in voluntary movement, lacks spontaneous breathing and heartbeat (although these can be maintained artificially), lacks “elicitable reflexes,” and has a flat electroencephalogram (EEG).  

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93 It is important to note that arousal here does not mean consciousness, although it a necessary component of consciousness.
94 The actual phrase used is “irreversible cessation of all brain function.” However, as demonstrated in this section, brain death criteria do not in fact require the cessation of all brain activity. This is a common criticism of the standard.
95 See Bernat, note 5 supra, at 384
96 DeGrazia, note 6 supra
97 Report of the Ad Hoc Committee Report, note 15 supra, at 337-38
The initial driving force behind adoption of whole-brain death was two fold. First, there was a need to alleviate the burden “on patients who suffer permanent loss of intellect, on families, on hospitals, and on those in need of hospital beds already occupied by comatose patients.” Second, the whole-brain death standard would facilitate organ procurement thereby increasing organ supply for which there was an unmet need.

Despite widespread acceptance, the whole-brain death standard has received its fair share of skepticism. As Fry-Revere points out, this standard requires the satisfaction of two precepts. First, cessation of neurological function must be equivalent to the death of the human being as a whole – a notion widely accepted by law and the public. As Bernat states, “the irreversible cessation of brain functions serves as a criterion for the cessation of the organism as a whole…[and] indicates that the brain dead patient is a mechanically supported, living component part of a human organism who has already died.” Second, and increasingly challenged, is the ability to accurately test those functions that must be lost to satisfy the whole-brain death standard. For example, a patient may meet the criteria for brain death, yet still exhibit some “evidence of ongoing integrated bodily activities,” such as a Babinski’s reflex; spontaneous movements of the limbs; respiratory-like movements; and sweating, blushing, and tachycardia. Furthermore, a patient may meet brain death criteria, but still have minimal brain activity that has been deemed “trivial” for the purpose of declaring death.

98 Id. at 337
99 Id.; See also Weyrauch, note 17 supra, at 99
100 Fry-Revere, note 4 supra, at 41
101 Caplan and Arp, note 62 supra, at 374
102 Fry-Revere, note 4 supra, at 41
103 Id.
104 UTMB Clinical Policies, Policy 9.15.9: Determination of Death (While these activities may not require cognitive functions, they do evidence integrated bodily activities)
The uncertainty surrounding whole-brain death may be further evidenced by “[t]he policy of waiting for a brain dead patient’s circulation to stop [after removal of life support] before harvesting organs” which “indicates a willingness to decrease organ viability for more certainty with respect to the determination of death of organ donors.”

Conversely, take the case of a patient who is not brain dead and wishes to be taken off life support and to donate his organs. In this case, circulatory criteria will be used to determine death such that the patient will be declared dead before he actually meets the criteria for brain death. Does this mean that brain criteria is not a precise account of death, or is circulatory-respiratory criteria a sham? The answer is neither. To wait for this patient to satisfy the criteria for brain death could mean sacrificing the viability of his organs, in spite of the fact that he wishes to be an organ donor. Moreover, this patient has in essence consented to being declared dead, even though it is questionable whether or not he is in fact dead, earlier on by requesting removal of life support and consenting to organ donation.

2. Neocortical, or Higher Brain Death, i.e., Irreversible Loss of Higher Brain Function

Higher brain death occurs when all of the higher parts of the brain responsible for consciousness, self-awareness, and subjective experience, permanently cease to function. Thus, when an individual incurs higher brain death, he or she no longer has the ability to fine tune lower functions; make complex multi-modular sensory associations; engage in voluntary motor control; respond to novel challenges; or initiate

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105 Fry-Revere, note 4 supra, at 64
106 See Chiong, note 55 supra, at 390-91
107 Id.
108 Id.2
109 Caplan and Arp, note 62 supra, at 372
abstract thinking and planning abilities.\textsuperscript{110} In neocortical death, it is the neocortex, or outer layer of the cortex that has sustained massive damage. These standards are controversial because the individual can still perform lower functions such as regulating breath, heartbeat, and, in some cases, a sleep/wake cycle without mechanical support, although the individual would still need life sustaining treatment such as artificial nutrition and hydration.\textsuperscript{111} Furthermore, the exact criterion for these standards are vague and the threshold for at what point the person would be considered “dead” is unclear.

The higher brain death standard defines death as the irreversible cessation of the capacity for consciousness, where consciousness is defined broadly to include both wakeful and dreaming states.\textsuperscript{112} Under this standard an individual in a dreamless sleep or reversible coma is alive, while an individual in a persistent vegetative state or permanent coma could be considered dead.\textsuperscript{113}

Currently no jurisdiction has adopted the higher brain death standard; however, it has received the support of many scholars.\textsuperscript{114} There are four independent, leading argumentative strategies in support of this approach, all of which involve “the irreversible loss of some property for which the capacity for consciousness is necessary.”\textsuperscript{115} First, some argue “human persons…are essentially beings with the capacity for consciousness

\textsuperscript{110} Id. at 372-73
\textsuperscript{111} Id. at 373 (Individuals who qualify for higher brain death may experience lower brain functions for many years. For example Karen Ann Quinlan and Terry Shiavo, both of whom were in a persistent vegetative state, remained in such a state for 10 and 15 years respectively)
\textsuperscript{112} DeGrazia, note 6 supra (Thus, an individual dies only when “the brain is incapable of returning to consciousness.” However, it is not totally clear at what point that is.)
\textsuperscript{113} Id.
\textsuperscript{114} Id.
\textsuperscript{115} Id. (The four approaches are (1) appeals to the essence of human persons, (2) appeals to personal identity, (3) the claim that the definition of death is a moral issue, and (4) the appeal to prudential value)
such that we cannot exist at any time without having this capacity at that time.”  

Loss of what is essential to our existence resulting in our death occurs with the irreversible loss of the capacity for consciousness.  

One might challenge this view by pointing out that a fetus prior to developing the capacity for consciousness, i.e. the brain, is alive; or that a patient in a persistent vegetative state “who is spontaneously breathing, circulating blood, and exhibiting a full range of brainstem reflexes appears to be alive.” A higher brain death proponent might respond that, although these “organisms” are “alive,” they are fundamentally different in that they are not minded beings due to their lack of a capacity for consciousness.  

The organism and the minded being are two closely associated, but independent, beings that can come into and go out of existence at different times. The view, however, requires the assumption that the mind and body are necessarily divisible – a view that many may be hesitant to embrace. One could also respond that the fetus is actually alive under this standard as a minded being, even before brain development, because the fetus does have the capacity for consciousness in that the fetus will emerge as a conscious being in the future. In this sense, the fetus has not irreversibly lost the capacity for consciousness. On the other end, a patient in a persistent vegetative state, despite being

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116 Id. (The appeal to “the essence of human persons” is one of the more influential bases for the higher-brain approach to death)  
117 Id. (Some proponents propose that we are essentially persons, while others propose that we are essentially human beings, or essentially minds or minded beings. Regardless of terminology, all views in support of the higher brain death standard conclude that “the irreversible loss of the capacity for consciousness…is sufficient for the loss of what is essential to [our] existence”)  
118 Id.  
119 According to DeGrazia and other authors, a minded being is a being with the capacity for consciousness  
120 DeGrazia, note 6 supra  
121 Id.  
122 Id.
conscious in the past, may never regain consciousness. Unlike the fetus who will become conscious, the patient in a persistent vegetative state who has irreversibly lost such ability is essentially dead under this standard.

The second argument appeals to personal identity and asserts that a person “[goes] out of existence once the capacity for consciousness has been irreversibly lost” regardless of what we are essentially. However, this argument in reality depends on the proposition that we are essentially minded beings. If we were essentially, for example, human animals, death would occur upon the breakdown of organismic functioning as opposed to the irreversible loss of the capacity for consciousness.

The third argument claims that death is a moral issue, the determination of which rests upon when it is appropriate to initiate “death behaviors,” such as removal of life support, burial or cremation, grieving, marital status, etc., and asserts that the appropriate time is marked by the irreversible loss of the capacity for consciousness. However, that many shared moral assumptions about death exist, such as that people should not be buried prior to death, does not necessarily mean that death itself is a moral issue.

The fourth leading argument appeals to prudential value, contending that because conscious life is a precondition for virtually everything that we value in our lives, we have little or no interest in continuing our lives if we are permanently unconscious. The primary challenge to this basis is premised on the presence of pluralistic views about prudential value. For example, some religions believe that “life is inherently precious to

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123 Id.
124 Id.
125 Id.
126 Id.
its possessor, even if the individual cannot appreciate its value at a given time." One might respond, however, that prudential value requires the ability to experience, which in turn requires consciousness.

3. Brainstem, or Lower Brain, Death, i.e., Irreversible Loss of Brainstem Function

Under the brainstem standard, death occurs upon the irreversible cessation of brainstem function. The brainstem controls autonomic functions, such as respiration, heartbeat, and arousal (but not consciousness). Thus, when the brainstem no longer works, neither can these vital autonomic functions absent artificial support. The brainstem standard for determining death offers the advantage of requiring fewer clinical tests. One may reason that consciousness is not possible without a functioning brainstem, and specifically without a functioning reticular activating system, which makes consciousness possible. It has also been argued that there can be “no cerebral projection if the brainstem is dead.” Notably, this standard has been adopted in the UK and many other countries.

C. Chiong’s Cluster of Features

Another promising approach, formulated by Winston Chiong, asserts that, while there is no essential feature associated with death, death should be determined based on a

\[\text{\underline{127}}\text{ Id.}\]
\[\text{\underline{128}}\text{ Id.}\]
\[\text{\underline{129}}\text{ Caplan and Alp, note 62 supra; Weyrauch, note 17 supra, at 94}\]
\[\text{\underline{130}}\text{ Caplan and Alp, not 62 supra}\]
\[\text{\underline{131}}\text{ DeGrazia, note 6 supra}\]
\[\text{\underline{132}}\text{ DeGrazia, note 6 supra}\]
\[\text{\underline{133}}\text{ Weyrauch, note 17 supra, at 94}\]
\[\text{\underline{134}}\text{ Id.}\]
cluster of features.\textsuperscript{135} Under this approach, various subsets of features relevant to whether someone is alive or dead would be sufficient for death, while other subsets may not be.\textsuperscript{136} Chiong categorizes “death” as a “natural kind,” meaning it probably has no necessary and sufficient conditions the must be met in order to belong to the group.\textsuperscript{137} Death has no indispensable characteristics and, further complicating the matter, various cultures, religions, and people adopt differing definitions.\textsuperscript{138} However, just because a lack of consensus or inability to clearly define death exists now does not necessarily mean that no unique definition of death exists.\textsuperscript{139}

Chiong proposes that various features are relevant to declaring death given the situation, but are not determinative on their own. For example, that a brain dead pregnant woman can be kept on life support until her baby is born does not necessarily show that she is still alive, but is relevant in considering whether or not she is alive or dead.\textsuperscript{140} Chiong’s relevant features include consciousness, spontaneous vital functions, responsiveness to environmental stimuli, integrated and coordinated functioning of multiple subsystems, ability to resist decay and putrefaction, the capacity to reproduce, and the capacity to grow.\textsuperscript{141}

Bernat criticizes Chiong’s approach as too vague because it does not describe specific criteria that doctors can use to determine death.\textsuperscript{142} This also raises legal concerns regarding shielding doctors from liability for reasonable medical decisions. Lack of a

\textsuperscript{135} Caplan and Alp, note 62 supra
\textsuperscript{136} Chiong, note 55 supra, at 391
\textsuperscript{137} Id. at 393
\textsuperscript{138} Id. at 394
\textsuperscript{139} DeGrazia, note 6 supra
\textsuperscript{140} Chiong, note 55 supra at 394
\textsuperscript{141} Id. at 395
\textsuperscript{142} Caplan and Alp, note 62 supra, at 374
discernable standard could open the door for litigation against doctors who unilaterally withdraw treatment or make a declaration of death with which the patient or family do not agree even if that decision was reasonable under Chiong’s approach. In this way, the standard’s vague boundaries invite wide discretion in determining criteria for death and this approach could lead to undesirable outcomes such as declaring a patient in a vegetative state or with locked-in syndrome as dead because that patient lacks many of Chiong’s relevant features.  

D. Permanent Cessation of all Biological Functions of an Organism

Although Li’s heart and lungs appeared to cease functioning, she clearly was not dead. We can make at least two speculations as to why she was not in fact dead: (1) her heartbeat and breathing had not actually stopped completely, but were merely undetectable; and (2) her heartbeat and breathing did stop or slow down for some time, but her brain and other parts of her body kept her alive in a quasi-sleep. Thus, under this standard for determining death, Li Xiufeng was never really dead because at no point did all of her biological processes cease to function.

Li’s story illustrates one potential drawback of using a standard that consists of criteria relating to only component parts of an organism when, as the physician Sir Henry Thomas noted, the only truly trustworthy proof that death has occurred is “a manifest

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143 DeGrazia, not 6 supra
144 Caplan and Alp, note 62 supra, at 370
145 Id.
146 Id. at 371
sign of commencing decomposition.” Commencement of decomposition takes place shortly after all of the parts and processes of the body shutdown.

The permanent cessation of all biological functions, evidenced by commencement of decomposition, makes sense in light of the fact that it is not totally uncommon for those who have been declared dead based on apparent cessation of cardiopulmonary function to auto-resuscitate. However, this standard has become largely defunct in light of the ability to artificially maintain the functioning of the heart and lungs while the brain has irreversibly and permanently ceased to function, thereby making it possible for some vital component parts of the organism to function absent other vital component parts.

E. Death as a Process, Not a Determinate Event

The death as a process approach asserts that, instead of one standard for all purposes, different standards for determining death may be appropriate for different purposes. Proponents of this approach view death itself, as opposed to “dying,” as a process, not an event that can be captured by a single standard. While life and death may be mutually exclusive, i.e., one cannot be both alive and dead at the same time, they are not exhaustive and an organism may exist in many different conditions.

Organ transplantation and the advent of the ventilator gave rise to three questions: (1) when doctors can take organs for transplantation, (2) when doctors can unilaterally discontinue life sustaining treatment, and (3) when a patient is legally dead and

147 Id. at 370
148 Id.
149 See Id.
150 See Bernat, note 5 supra, at 377
151 DeGrazia, note 6 supra
152 Id.
153 Id.
appropriately transferred to an undertaker.\textsuperscript{154} Most approaches attempt to answer all three questions all together with a single standard. Proponents of this view maintain that each question should be answered separately on its own merits.\textsuperscript{155} Halevy and Brody (1993), for example, suggest that whole-brain death be used for organ procurement, higher-brain death for discontinuation of treatment, and cardiopulmonary death for legal purposes.\textsuperscript{156}

There are three general criticisms to this approach. First, a simpler approach might be to adopt an updated traditional standard while denying that organ procurement and discontinuation of treatment must await death.\textsuperscript{157} However, that approach could lead to problems of its own. For example, permitting organ procurement before a declaration of death could authorize physicians to essentially kill a patient by organ retrieval, an idea that goes against our basic intuition against murder. Second, that the line between life and death may be blurry and that any individual standard may require some arbitrary line drawing does not necessarily preclude the existence of a uniquely correct standard.\textsuperscript{158} Third, even if death itself is in fact a process rather than a determinate event, society is accustomed to thinking of life and death as exhaustive categories, and disaggregating death may result in confusion and be troubling to those who assume we go out of existence at a single point in time.\textsuperscript{159} Proponents would respond that “disaggregating death…would be…faithful to fact about the frequently very gradual demise of human
persons,“ similar to how the disaggregation of “adulthood” is faithful to the gradual process of maturity.\(^{160}\)

**F. Discontinuity of Personality and Intellectual Function**

The notion that death occurs upon the discontinuity of personality and intellectual function is premised on the idea that our concept of “self” does not remain constant throughout our existence.\(^{161}\) Whether death has occurred depends on “whether there are psychological and intellectual transformations of such magnitude and import that when they take place, it legitimately can be concluded that the former person has ceased to exist.”\(^{162}\) Once discontinuity reaches a certain threshold level the individual’s initial personal identity ceases to exist, thereby permitting differential treatment of that individual under the law.\(^{163}\)

While this approach recognizes that human beings are vastly greater than the sum of our biological parts, there is no clear-cut threshold level of when someone’s personality is sufficiently destroyed to warrant a declaration of death, which could be a slippery slope to clearly problematic results.\(^{164}\) For example, it could possibly be argued that a person who develops schizophrenia, Alzheimer’s, or some other severe mental disorder be declared dead under this approach when, intuitively, such people are alive.\(^{165}\) Furthermore, this approach is intrinsically related to the notion that death is the irreversible loss of personhood, which Bernat rejects, under one of his seven elements of

\(^{160}\) *Id.* (The law recognizes different stages of maturity by allowing people to drive at age 16, vote and be considered an adult under criminal law at age 18, and drink at age 21)

\(^{161}\) Friedland, note 1 *supra*, at 123

\(^{162}\) *Id.*

\(^{163}\) *Id.* at 124

\(^{164}\) *Id.*

\(^{165}\) *Id.*
the paradigm of death that “personhood is a psychosocial, religious, moral, and legal construct that may be lost in some cases of severe brain damage but cannot die, except metaphorically.”

IV. CURRENT STATE OF THE LAW

Historically the common law defined death as the cessation of cardiorespiratory function because if cardiac and respiratory functions ceased, the rest of the body would soon fail as well. However, modern medical technologies that can artificially maintain the heart and lungs have obscured this traditional criterion. This has resulted in the emergence of new standards and adoption of both the cardio-respiratory and total brain death standards in essentially all United States jurisdictions in order to combat the shortcomings of one or the other. However, laws, whether statutory or common, vary from one jurisdiction to another in language and application. In order for the legal system to adequately deal with the issues surrounding the declaration of death, we need a “predictable and uniform definition” of death.

While inconsistencies within the law across, and even within, jurisdictions certainly exist and implementation may vary, consensus within the medical community has led to “standardized clinical practice guidelines and reasonably uniform death

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166 Bernat, note 5 supra, at 380
167 Friedland, note 1 supra, at 106 and 120
168 Id. at 120
169 See Id. at 44-56
170 Id. at 125
171 See Id. at 44-56 (possible inconsistencies may exist concerning when each standard is used to declare death, the minimum resuscitative efforts required, the role of the physician, what types of “brain activity” may be excluded such that they do not prevent a declaration of death, procedures allowed before death, communication regarding organ retrieval process, etc.)
The policy adopted in the vast majority of states reflects some formulation of the Uniform Declaration of Death Act of 1978 (UDDA) approved by the National Conference of Commissioners on Uniform State Law (NCCUSL) in 1981. Under the UDDA, “an individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions, or (2) irreversible cessation of all functions of the entire brain, including the brainstem, is dead. A determination of death must be made in accordance with accepted medical standards.” The UDDA recognizes the close relationship between circulatory death and brain death, but also acknowledges the impracticality of requiring only one standard.

The 1991 Patient Self Determination Act and all US States have also provided for some form of advance directive, which allows people to direct health care decisions before they become unable to do so through an advance directive, such as a living will, or a surrogate. A living will “directs health care decisions…under specific circumstances,” whereas a durable health care power of attorney, or health care proxy, authorizes another person to make such decisions. Advance directives are often used by those with terminal illnesses or progressive neurological diseases such as Alzheimer’s and may direct decisions regarding such things as discontinuation of treatment.

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172 Bernat, note 5 supra, at 378
173 Fry-Revere, note 4 supra, at 31
174 Uniform Declaration of Death Act of 1978
175 Id.
176 Requiring only circulatory death would preclude declaring those patients dead who have no brain activity, but whose circulatory functions are sustained by artificial life support. Requiring only brain death would preclude those who suffer cardiac arrest and cannot be resuscitated from being declared dead for a substantial amount of time such that organs would no longer be viable.
177 Friedland, note 1 supra, at 131-32
178 Id. at 131
Advance directives are invaluable tools to help thwart the conflict inevitable in attempts to determine a unitary definition of death that provides consistency and fosters public trust in the legal and medical communities. However, advance directives ask individuals to predict how he or she will feel about a certain treatment, or treatment generally, in the future. Thus, they fail to take into account how a person’s attitude might change over time or the fact that many people feel differently than they had predicted when actually faced with a certain situation.\textsuperscript{179}

Even more so, living wills are limited in scope and lack flexibility because they are “often dependent on specific circumstances that cannot cover the many permutations that may arise” in an individual case.\textsuperscript{180} While use of a health care proxy allows for greater flexibility, a proxy may not always be able to act in the patient’s best interest absent knowledge of the patient’s wishes or if the proxy is emotionally invested in the patient, and health care professionals may be able to object to the proxy’s decisions in certain situations.\textsuperscript{181} Most of all, advance directives are substantially underutilized, perhaps because people are unaware of them or do not understand how they work.\textsuperscript{182} If people do understand how advance directives work, they may be hesitant to utilize them either because they do not want to deal with death-related issues or because they do not know what they would want.\textsuperscript{183}

\textsuperscript{179} See \textit{Id.} at 132
\textsuperscript{180} \textit{Id.} at 133-34
\textsuperscript{181} \textit{Id.} at 135 and 137
\textsuperscript{182} \textit{Id.} at 132
\textsuperscript{183} \textit{Id.}
V. PROPOSAL

A. Any Current Standard is Too Uncertain

The dilemma is that “far reaching adverse consequences” actually happen at two ends of the spectrum. On the one side, there are people whose life (or death?) is prolonged even as their brain and body deteriorates and when there is virtually no chance of recovery, such as the case of Nancy Cruzan. As Friedland notes, patients are often subjected to “treatment that unnaturally prolongs the dying process…Our health care system has become so obsessed with extending life, at times neglecting the caring component of medicine and trampling on the rights of patients.”\(^{184}\) Furthermore, “experienced neurologists are capable of making reliable diagnoses in some cases without waiting 6 months or a year to see if the patient regains any neurological functioning”\(^{185}\) (emphasis added).

On the other side, there are people who are taken off life sustaining treatment who could have regained a higher level of functioning, although not necessarily a full recovery. While some standard is needed in order to further the interests of human dignity and saving lives through organ transplantation, “any standard for diagnosis has false positives so that withdrawing care and allowing any group of patients to expire absolutely means that one is accepting the death of some persons who would have recovered to a higher level of function” (emphasis added).\(^{186}\)
Upon careful examination of this dilemma, the issue that emerges is not that of at what point a human being dies, but rather at what point the person is so irreversibly lost that further treatment is futile, even inhumane. The key word is “irreversibly.” The brain has astonishingly regenerative properties. Contrary to historical belief, neurogenesis can occur in parts of the brain, namely the subventricular zone and the hippocampus. Moreover, neurons can sprout new connections allowing undamaged areas to assume the functions seemingly lost by damage to other areas.

However, in spite of recent and vast scientific advancements, the mind remains elusive. Weighing in at only three pounds, or approximately 2 percent of our body weight, the brain consumes 20 percent of our total energy. With approximately 100 billion neurons, the same number as stars in the Milky Way Galaxy, and “an exponential amount of neural connections and pathways,” the brain is possibly the most complex object thus far known to man. No wonder its function has escaped and baffled the minds of even the most respected philosophers of science for centuries.

When neuroscience was in its infancy, exploration of the brain required often tedious, indirect, or invasive techniques such as dissecting the brains of other animals,

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187 Carmichael Laboratory, David Geffen School of Medicine at UCLA, http://carmichaellab.neurology.ucla.edu/subject/neurogenesis-after-stroke (“Stroke signals to stem cell populations in the adult brain to divide, and to send immature neurons to areas of damage.”)

188 Carmichael Laboratory, David Geffen School of Medicine at UCLA, http://carmichaellab.neurology.ucla.edu/subject/neuronal-growth-program

189 See Michio Kaku, The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind, 1 (2014) (“With our vast technology, we have been able to photograph galaxies billions of light-years away, manipulate the genes that control life, and probe the inner sanctum of the atom, but the mind…still elude[s] and tantalize[s] us.”)

190 Id. at 3-4

191 Id. at 4

192 Id. at 3 (The ancient Egyptians thought the brain was “a useless organ and threw it away when embalming their pharaohs.” Aristotle believed the soul resided in the heart and the brain functioned only to cool down the cardiovascular system. Descartes thought the soul entered the body through the pineal gland.)
analyzing the brains of victims of stroke and disease post-mortem, and probing the brain with electrodes.\textsuperscript{193} New technologies such as magnetic resonance imaging (MRI), positron emission tomography (PET), and other advanced technologies that can measure the activity of the brain have carted in a new age of neuroscience, which offers vast potential for better diagnosis and prognosis as well as enhancing and repairing the mind.\textsuperscript{194} A new study that assessed two neuroimaging-based diagnostic methods, PET imaging and fMRI, found that not only does PET imaging have higher sensitivity for identification of patients than fMRI, it also correctly predicted the outcome in 75 out of 102 patients, or 74\% of the time.\textsuperscript{195} Doctors initially diagnosed the patients in the study by performing clinical neurological examinations using the coma recovery scale (CRS-R).\textsuperscript{196} The coma recovery scale is considered the most reliable assessment for disorders of consciousness such as vegetative state and minimally conscious state.\textsuperscript{197} 32\% of patients, 13 out of 42, diagnosed as behaviorally unresponsive with CRS-R “showed brain activity compatible with (minimal) consciousness” and 69\% of such patients subsequently recovered consciousness.\textsuperscript{198}

Already, with fMRI and PET imaging, we have discovered that many of those thought to be completely unaware based on clinical observations can in fact engage in

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\textsuperscript{193} Id. at 4
\textsuperscript{194} Id. at 5-10 (According to Kaku, new scientific discoveries and advancements make it possible to one day control objects with the mind via a computer as well as “control and manipulate the brain to manage diseases such as depression, Parkinson’s, Alzheimer’s, and many more.”)
\textsuperscript{195} Steven Laureys et al., \textit{Diagnostic precision of PET imaging and functional MRI in disorders of consciousness: a clinical validation study}, The Lancet, doi: 10.1016/S0140-6736(14)60042-8 (April 16, 2014)
\textsuperscript{196} Denise Grady, \textit{PET Scans Offer Clues on Vegetative States}, New York Times (April 15, 2014)
\textsuperscript{197} Id.
\textsuperscript{198} Laureys et al., note 193 supra
\end{flushleft}
some cognitive processes and even answer yes/no questions,\textsuperscript{199} showing that clinical tests may be even less accurate than previously thought. It seems that studies such as these have yet to be performed using patients who have met the clinical criteria for brain death. Thus, due to the inherent unreliability of clinical tests and the lack of clear-cut thresholds for when loss of function is irreversible, any of the accepted and emergent standards are vastly uncertain, and we should proceed with caution in our decisions to declare someone dead or discontinue life-sustaining treatment.

B. Three Pronged-Proposal: Changing the Definition of Death, Strengthening Advance Directives, and Enhancing Current Research

The standards by which we make a declaration of death are better thought of as standards by which we make the determination that life-sustaining treatment may, or should, be withdrawn because treatment is futile and death is certain. A fundamental tenet of “death” is that it is both permanent and irreversible. Furthermore, the notion that a human being dies before every part of that being has irreversibly ceased to function is difficult, if not impossible, to accept with the same conviction that we accept that someone who has lost \textit{all} integrated functioning is dead.

Defining death as anything short of the total cessation of all functions evokes unsettling uncertainty and naturally gives rise to the question of, if part of any organism can be kept alive, is that organism \textit{truly} dead? If part of a person can be kept alive, whether by ventilator, artificial nutrition and hydration, or other life-sustaining treatment, is it really that far out of reach to wonder if those functions could ever resume on their own, bearing in mind that even patients who meet the criteria for whole-brain death may actually have minimal brain activity?

\textsuperscript{199} See Lupkin, note 52 \textit{supra}
Moreover, the use of terms such as “cardiopulmonary death,” “brain death,” and the other derivative brain death standards to describe a state in which an individual exhibits characteristics of both “life” and “death,” but does not fully qualify for either, creates unsettling uncertainty in the minds of the public. It creates ambiguity in the law resulting in adverse consequences on both ends of the spectrum and an atmosphere of distrust in the law as well as in the medical profession.

At the same time it is legally and socially necessary to determine at what point a person can be declared dead by medical professionals, at what point life-sustaining treatment should be withdrawn, and at what point organ procurement procedures may commence. However, how we define death should not rest on what definition will provide the best avenue for cost-containment or the earliest possible point when organ procurement can begin, but rather on what standard will best further the interests of human dignity.

Thus, I propose that terms such as “total brain death,” “higher brain death,” “cardiopulmonary death,” etc. are replaced with terms that better reflect the reality that the individual is not in fact dead, even if death is a near certainty. Furthermore, while we tend to think of life and death as exhaustive categories, this need not be the case. People who exhibit characteristics of both life and death, but do not fall into either category, fall into a different category of life-cycle states. Only once it is determined that a person has fallen into such a state can criteria be applied to determine appropriateness of discontinuing treatment and commencement of organ procurement, and advance directives can serve as an effective aid in such situations.
Absent an advance directive or clear indication of the person’s wishes, the unilateral discontinuation of treatment should be allowed only when it is certain that life-sustaining treatment has become death-prolonging treatment. As discussed below, more research is greatly needed to determine exact criteria for this standard. However, at this point, clinical examinations should be combined with brain-imaging techniques to determine if the person has retained brain activity consistent with any level of consciousness. Unilateral withdrawal of treatment may be allowed upon confirmation that no conscious ability remains. This standard would better ensure that those who have no reasonable probability of regaining a higher level of functioning are not maintained on death-prolonging treatment, while giving those who potentially could regain higher functioning the opportunity to do so.

Thereafter, a declaration of death should be allowed no earlier than the point at which all integrated circulatory and brain functions have ceased to function, not upon just “brain death” or just “cardiorespiratory death.” Declaring death at the point at which death actually occurs will provide much more certainty that the person would not have recovered, will provide consistency throughout the law and medical practice, and will foster public trust and a sense of security. In turn, greater trust in the law and the medical community due to more certainty regarding the declaration of death could have an indirect, but immensely positive, impact on people’s willingness to become organ donors.

Another step towards providing certainty within the law while respecting society’s pluralistic views on death would be more widespread use of devices such as advance directives. A stronger policy regarding advance directives would respect individual choice while providing a potential avenue for increasing the supply of organs.

200 Fry-Revere, note 4 supra, at 2
This would require not just changes in the law, but also changes in medical practice and the dissemination of information.

While advance directives are not a catchall solution, they can provide a best guess regarding what an individual would want in a certain situation. This best guess would be even more reliable if people were more informed about various medical conditions, treatments, and outcomes. Providing people with more information would greatly alleviate the concern that many people would in fact change their mind in such a situation.

For this reason, an initiative should take place to increase awareness of advance directives, what they are, and how to create one. It should be part of regular routine for doctors to inform each of their patients about advance directives and help guide their patients through the process of creating one if the patient wishes to do so. While it will not be possible to cover every situation that could potentially arise, people need to be fully informed about the wide range of circumstances in which a directive may be utilized, as well as the consequences of various decisions. For example, in regards to a persistent vegetative state, the person should be informed about what it means to be in a persistent vegetative state, the benefits and risks of life-sustaining treatment, and the possible outcomes.

Another way to increase the utilization and effectiveness of advance directives would be to create a strong online presence and a website that would provide people with easy to read information and instructions. This website could possibly even allow people to fill out and save and/or print an advance directive using step-by-step guidance and instructions. At each point in the decision-making process, the individual would be fully
informed about the condition at issue, the treatments available, and the possible outcomes. People would then be able to share their advance directive with friends, family, and doctors who would implement the directive should there ever be a need. This would also enable people to easily update their advance directives at any point if their feelings change, and provide a way to easily disseminate information regarding any new medical advancement that might have a bearing on people’s treatment decisions.

Finally, the research in this area, although growing, is sparse. More research needs to be done, for example using brain-imaging technology such as fMRI or PET, regarding the various states of altered consciousness and their long-term prognoses. This is essential in order to pin down the point at which life-sustaining treatment becomes death-prolonging treatment.

Brain activity is often measured using an electroencephalogram (EEG). The EEG has good temporal resolution and can measure the amount of activity going on in the brain right then. However, the EEG has poor spatial resolution making it “impossible to say for sure which part of the brain created [the measured output].” This is problematic because how much activity there is overall is not necessarily determinative of the level of cognitive functioning. Rather, it is probably the connectivity between various parts of the brain that is most important. For example, depending on what part of the brain is damaged, a person with less brain activity could actually be more functional than someone with more. The extent and areas damaged may also have a

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201 Including vegetative states and the minimally conscious state
202 See Kaku, note 180 supra, at 24-26
203 Id. at 26
204 Interview with Dr. Sherer (March 2014)
205 Id.
206 Id.
bearing on outcome, or long-term prognosis. We must know the implications of the various standards in various situations before we can adopt any of them with certainty and with the force of law.

C. Conclusion

Our current assumptions about death and the interrelation between cessation of certain vital functions and others turn out to be true much of the time, but not always. For this reason the current standards and proposed standards, while appropriate for use under certain circumstances such as determining when to withdraw life-sustaining treatment, should not be used to make a determination of death. Furthermore, these standards should be applied with caution and take into account both the individual’s wishes and recent scientific advancements.

The central issue should be, not at what point a human being dies, but rather at what point that person is so irreversibly lost that further treatment is futile, even inhumane. In order to foster trust and certainty in the medical and legal communities, a declaration of death should be allowed no earlier than the point at which all integrated circulatory and brain functions have ceased. Unilateral withdrawal of treatment should occur only when such treatment has become death prolonging rather than life sustaining. Standards for when medical professionals may unilaterally discontinue treatment or begin organ procurement should abandon the use of the word “death.” In order to respect the vast amount of various beliefs regarding these issues, the policy in favor of advance directives should be strengthened and more widespread use of such devices should be encouraged through better education and more pervasive dissemination of information.
Lastly, more research needs to be done in this enormously under-studied area of science. Already we have discovered from the work of Adrian Owen and others that people previously thought to lack any conscious awareness may in fact be conscious of their surroundings to the extent that they can understand and answer yes/no questions. We must be cautious to avoid making quality of life decisions for such people, while at the same time prevent the degradation of human dignity by ensuring that we do not unnecessarily maintain people on death prolonging treatment. As we have seen, severe indignities can occur at both ends of the spectrum and the law must work to prevent such consequences on both sides.