

LEGAL RECOGNITION OF NEOCORTICAL DEATH

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“[Man] knows death to the bone—
Man has created death.”

—William Butler Yeats, *Death*

All human beings know the fact and reality of death, yet mankind's very existence is in many ways a search to understand death. As Samuel Johnson observed to Boswell, “the whole of life is but keeping away the thoughts of it.”¹ Throughout history, theologians, philosophers, and poets have struggled with the meaning of death. Saint Augustine asked what type of death God intended to enforce His commands: “Was it the death of the soul, or of the body, or of the entire man, or the so-called second death?”² Yet for Dylan Thomas, “[a]fter the first death, there is no other.”³ The law must also face death, particularly the dilemma created by advances in medical science that permit the artificial maintenance of heart, lung, and nourishment functions.

This Article examines the law's approach to death by inquiring into the legal issues raised by cardiopulmonary, whole brain, and neocortical definitions of death. The term “cardiopulmonary death” means the irreversible cessation of heart and lung functions.⁴ “Whole brain death” means the irreversible cessation of all

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¹ 2 J. BOSWELL, *BOSWELL'S LIFE OF JOHNSON* 93 (Oxford Univ. Clarendon Press ed. 1934).

² ST. AUGUSTINE, *THE CITY OF GOD [De Civitate Dei]* 277 (Image Books ed. 1958). Augustine's next sentence provides a response: “The answer is: every kind of death.” *Id.*

³ Thomas, *A Refusal to Mourn the Death, by Fire, of a Child in London*, in *THE NORTON ANTHOLOGY OF MODERN POETRY* 909 (R. Ellmann & R. O'Clair eds. 1973).

⁴ Cardiopulmonary cessation or the irreversible loss of vital fluid flow (air and blood) historically has served as the criterion for determination of death. PRESIDENT'S COMMISSION FOR THE STUDY OF ETHICAL PROBLEMS IN MEDICINE AND BIOMEDICAL AND BEHAVIORAL RESEARCH, *DEFINING DEATH, A REPORT ON THE MEDICAL, LEGAL AND ETHICAL ISSUES IN THE DETERMINATION OF DEATH* 5 (1981) [hereinafter cited as PRESIDENT'S COMMISSION]; Joynt, *A New Look at Death*, 252 J. A.M.A. 680 (1984). Cardiopulmonary death is indicated by the absence of pulse and a flat-line electrocardiographic response. Younger & Bartlett, *Human Death and High Technology: The Failure of Whole-Brain Formulations*, 99 ANNALS OF INTERNAL MED. 252, 253 (1983).

functions of the entire brain, including the brain stem.⁵ "Neocortical death" means the irreversible loss of consciousness and cognitive functions.⁶

Several arguments and a proposal emerge from this examination of the legal issues raised by definitions of death. The law should and does define criteria for death. The vast majority of

⁵ See PRESIDENT'S COMMISSION, *supra* note 4, at 32-38; Bernat, Culver & Gert, *On the Definition and Criterion of Death*, 94 ANNALS OF INTERNAL MED. 389 (1981); Bernat, Culver & Gert, *Defining Death in Theory and Practice*, 12 HASTINGS CENTER REP. 5 (1982). Whole brain death requires a finding of irreversible loss of noncognitive integrating capacities. Younger & Bartlett, *supra* note 4, at 253. A diagnosis of whole brain death is generally made in accordance with one of several sets of criteria: the guidelines for diagnosis of whole brain death set forth by the President's Commission, *Report of the Medical Consultants on the Diagnosis of Death to the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, Guidelines for the Determination of Death*, 246 J. A.M.A. 2184 (1981); the National Institutes of Neurological Diseases and Stroke criteria, *An Appraisal of the Criteria of Cerebral Death, A Summary Statement, A Collaborative Study*, 237 J. A.M.A. 982 (1977); the British criteria, Conference of the Royal Colleges and Faculties of the United Kingdom, *Diagnosis of Brain Death*, 2 LANCET 1069 (1976); or the Harvard criteria, *Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death, A Definition of Irreversible Coma*, 205 J. A.M.A. 337 (1968). All of these guidelines include nearly identical clinical points, however, the guidelines contain some differences as to the duration of observation necessary to establish the diagnosis as well as the emphasis to be placed upon laboratory diagnosis procedures such as the electroencephalogram. See F. PLUM & J. POSNER, *supra* note 4, at 314-23; Walker, *Current Concepts of Brain Death*, 15 J. NEUROSURGICAL NURSING 261, 263 (1983) ("In the past twenty years, a number of sets of criteria have been formulated for the determination of cerebral death. Of the earlier ones, the Harvard criteria were the best known. However, these guidelines have been found to be unnecessarily restrictive.").

⁶ The term "neocortical death" defines a clinical condition in which the critical elements of the central nervous system have been destroyed, leaving the patient in an irreversible unconscious condition. Neocortical death "occurs when the brain damage is permanent and sufficiently severe that the individual is thereafter unable to maintain homeostasis (i.e., gives no self-awareness and is unable to respond behaviorally in any major or appropriate way to the environment), even though the brain stem may continue to maintain internal (vegetative) homeostasis." F. PLUM & J. POSNER, *THE DIAGNOSIS OF STUPOR AND COMA* 313 (3d ed. 1982). "Neocortical death" embraces the terms "persistent vegetative state," "noncognitive state," "apallic syndrome," "cerebral death" (irreversible destruction of both cerebral hemispheres), and "irreversible lesions of the mid-brain reticular formation." See Ingvar, Brun, Johansson & Samuelsson, *Survival After Severe Cerebral Anoxia with Destruction of the Cerebral Cortex: The Apallic Syndrome*, 315 ANNALS OF N.Y. ACAD. OF SCI. 184-85 (1978) [hereinafter cited as Ingvar]; Korein, *Terminology, Definitions, and Usage*, 315 ANNALS OF N.Y. ACAD. OF SCI. 6-10 (1978); Ladanyi, *Residual Sentience and Cognitive Death: Ethical Issues in Brain Death and the Persistent Vegetative State*, 131 CANADIAN MED. ASSOC. J. 632, 634-35 (1984); J. Posner, *Coma and Other States of Consciousness: The Differential Diagnosis of Brain Death*, 315 ANNALS OF N.Y. ACAD. OF SCI. 215-27 (1978).

The state of residual sentience known as the "locked-in syndrome," in which patients suffer paralysis of all four extremities and the lower cranial nerves yet retain consciousness, is not included within the definition of neocortical death. F. PLUM & J. POSNER, *supra* at 6. See also Meinenberg, Mumenthaler & Karbowski, *Quadriplegia and Nuclear Oculomotor Palsy With Total Bilateral Ptosis Mimicking Coma: A Mesencephalic 'Locked-In Syndrome'?*, 36 ARCHIVES NEUROLOGY 708 (1979).

states either by statute or judicial decision now supplement the cardiopulmonary test for death with a whole brain death standard.⁷ Although widely accepted, the whole brain definition of death is itself mortal—a creation of prevailing medical technologies and a conservative death orthodoxy. This Article advances the legal analysis of death by arguing that neocortical death should be considered the death of the person for all legal purposes.⁸ Law and medicine now give de facto recognition to the validity of the neocortical definition of death by allowing private decisions to withhold or terminate treatment and nourishment of irreversibly noncognitive patients in a persistent vegetative state. Moreover, recent state-of-the-art medical developments in positron emission tomography (PET) scanning permit accurate diagnosis of neocortical death, thereby facilitating the inclusion of neocortical death within the legal definition of death. Although irreversible loss of consciousness and cerebration should establish legal death, the deceased (by a prior written directive) or the family of the deceased should have the option of maintaining biological existence, subject to the financial ability of the estate or family to shoulder the costs of biological maintenance.

I

THE DEVELOPMENT OF THE WHOLE BRAIN DEFINITION OF DEATH

Death triggers important legal consequences. A determination of death ends marriage and business partnerships, begins the process of disposing of a deceased's property, and may signal the obligation of a life insurance company to pay death benefits⁹ or a hospital's right to remove the deceased's donated organs for transplantation.¹⁰ Criminal liability for homicide depends upon the death of a person. Given the significance of death as a condition precedent to a wide array of legal rights and results, one would think it desirable for law and medicine to formulate a precise conception of when death occurs and what the term "death" means. Until recently, however, the law did not undertake to define death in terms that take into account the new developments in artificial life-support systems and organ transplants.

For example, suppose *D* shoots *V* in the head. *V* is rushed to the hospital, placed on a respirator, and administered medication to

⁷ See *infra* notes 14-15.

⁸ See *infra* text accompanying notes 40-160.

⁹ See, e.g., Thornton & Staff, *Death and the Life Insurance Policy: What Hath Modern Medicine Wrought*, 36 OKLA. L. REV. 285, 290-91 (1983).

¹⁰ See PRESIDENT'S COMMISSION, *supra* note 4, at 23.

maintain blood pressure. The next morning, a neurologist examines *V* and finds an irreversible cessation of all function of *V*'s entire brain. With the consent of *V*'s legal guardian, physicians remove *V*'s organs for transplantation purposes. The respirator is then disconnected, and *V*'s breathing and heartbeat stop. Has *D* committed homicide? Were the medical procedures performed by the physicians a superseding cause of death?

The New York Court of Appeals faced these facts and issues in *People v. Eulo*.¹¹ The defendants argued that even if they were guilty of shooting the victim in the head, they could not be guilty of murder because they had not caused the death of the victim. The defendants alleged that under New York law the court should have charged the jury on the cardiopulmonary definition of death. The court rejected these contentions, holding that the defendants were guilty of murder because whole brain death could properly be included within the legal definition of death. The court found that death occurs either upon a medical finding of cardiopulmonary death, or, when a determination that cardiopulmonary functions have ceased is not possible because artificial means of support are in use, upon a medical finding that the patient is whole brain dead.¹² *Eulo* is a recent example of the law's growing need to resolve the conflict between the conventional view of death as the irreversible cessation of heart and lung functioning and the medical community's growing reliance and acceptance of brain death criteria.¹³ A substantial number of cases explicitly or implicitly recognize a whole brain death definition when application of the traditional cardiopulmonary standards would produce unjust results.

In response to the nagging uncertainties caused by the development of sophisticated life-support technologies, the law now expressly acknowledges whole brain death as a definition for death. Thirty-three states and the District of Columbia have enacted statutes that incorporate whole brain death into their definitions of death.¹⁴ Courts in seven other states have adopted a whole brain

¹¹ 63 N.Y.2d 341, 472 N.E.2d 286, 482 N.Y.S.2d 436 (1984).

¹² *Id.* at 357-58, 472 N.E.2d at 296, 482 N.Y.S.2d at 446.

¹³ For earlier examples, see *In re Estate of Schmidt*, 261 Cal. App. 2d 262, 273, 67 Cal. Rptr. 847, 854 (1968); *Schmitt v. Pierce*, 344 S.W.2d 120, 133 (Mo. 1961); *Smith v. Smith*, 229 Ark. 579, 586, 317 S.W.2d 275, 279 (1958); *Vieth, Brain Death and Organ Transplantation*, 315 ANNALS OF N.Y. ACAD. OF SCI. 417, 426-28 (1978). See also *Ufford, Brain Death/Termination of Heroic Efforts to Save Life—Who Decides?*, 19 WASHBURN L.J. 225, 230 (1980).

¹⁴ ALA. CODE §§ 22-31-1 (1975); ALASKA STAT. § 09.65.120 (1983); ARK. STAT. ANN. §§ 82-537 to 82-538 (1976 & Supp. 1985); CAL. HEALTH & SAFETY CODE §§ 7180-7183 (West 1970 & Supp. 1986); COLO. REV. STAT. § 12-36-136 (1977 & Supp. 1985); CONN. GEN. STAT. ANN. § 19a-278(b) & (c) (West 1985 Special Pamphlet) (part of Uniform Anatomical Gift Act, 8A U.L.A. 15 (1975)); D.C. CODE ANN. § 6-2401 (1982); FLA. STAT.

death definition, some for all contexts and some for the limited purpose of establishing death under homicide laws.¹⁵ No reported case has rejected the whole brain death definition when the issue has been raised.¹⁶

Six of the forty states that have updated legal definitions of death define death by sole or primary reliance on a whole brain death standard as determined by accepted methods of medical practice.¹⁷ The Uniform Determination of Death Act adopts an alternative test:¹⁸ either the cardiopulmonary or the whole brain

§ 382.085 (Supp. Pamphlet 1974-1983); GA. CODE ANN. § 88-1716 (1979 & Supp. 1984); HAWAII REV. STAT. § 327 C-1 (1976 & Supp. 1984); IDAHO CODE § 54-1819 (1981); ILL. ANN. STAT. ch. 110 1/2 § 302 (Smith-Hurd 1978) (part of Uniform Anatomical Gift Act, 8A U.L.A. 15 (1975)); IOWA CODE ANN. § 702.8 (West 1976); KAN. STAT. ANN. § 77-205 (1984); LA. REV. STAT. ANN. § 9:111 (1965 & Supp. 1986); ME. REV. STAT. ANN. tit. 22, §§ 2811-2813 (1964 & Supp. 1985); MD. HEALTH-GEN. CODE ANN. §§ 5-201 to 202 (1982 & Supp. 1985); MICH. STAT. ANN. § 14.15 (1021-1023) (Callaghan 1980 & Supp. 1985); MISS. CODE ANN. §§ 41-36-3 (1981); MONT. CODE ANN. § 50-22-101 (1983); NEV. REV. STAT. § 451.007 (1979); N.M. STAT. ANN. § 12-2-4 (1978); N.C. GEN. STAT. § 90-323 (1985); OHIO REV. CODE ANN. § 2108.30 (Page 1976 & Supp. 1984); OKLA. STAT. ANN. tit. 63, § 1-301(g) (West 1975); OR. REV. STAT. § 146.001 (1984); PA. STAT. ANN. tit. 35, §§ 10201 to 10203 (Purdon 1984 Supp.); R.I. GEN. LAWS § 23-4-16 (1985); TENN. CODE ANN. § 68-3-501 (1982); TEX. REV. CIV. STAT. ANN. art. 4447t (Vernon 1976 & Supp. 1986); VT. STAT. ANN. tit. 18, § 5218 (1968 & Supp. 1985); VA. CODE § 54-325.7 (1982 & Supp. 1985); W. VA. CODE § 16-10-1 to 16-10-3 (1985); WIS. STAT. § 146.71 (Supp. 1985); WYO. STAT. § 35-19-101 (Supp. 1985).

¹⁵ *State v. Fierro*, 124 Ariz. 182, 185-86, 603 P.2d 74, 77-78 (1979) (homicide); *Swafford v. State*, 421 N.E.2d 596, 602 (Ind. 1981) (homicide); *Commonwealth v. Gols-ton*, 373 Mass. 249, 253-55, 366 N.E.2d 744, 744-49 (1977) (homicide), *cert. denied*, 434 U.S. 1039 (1978); *State v. Meints*, 212 Neb. 410, 419-20, 322 N.W.2d 809, 814 (1982) (homicide); *State v. Watson*, 191 N.J. Super. 464, 466, 467 A.2d 590, 591 (1983) (homicide); *People v. Eulo*, 63 N.Y.2d 341, 357-58, 472 N.E.2d 286, 296, 482 N.Y.S.2d 436, 446 (1984) (generally); *In re Bowman*, 94 Wash. 2d 407, 421, 617 P.2d 731, 738 (1980) (generally). The Colorado legislature adopted a whole brain death definition, COLO. REV. STAT. § 12-36-36 (1977 & Supp. 1985), after the Colorado Supreme Court recognized whole brain death in *Lovato v. District Court*, 198 Colo. 419, 433, 601 P.2d 1072, 1081 (1979). Illinois adopted whole brain death as a legal definition of death in *In re Haymer*, 115 Ill. App. 3d 349, 355, 450 N.E.2d 940, 945 (1983). The court viewed the whole brain death definition set out in Illinois's version of the Uniform Anatomical Gift Act, ILL. ANN. STAT. ch. 110 1/2, § 302 (1978), as limited to that particular statute. 115 Ill. App. 3d at 355, 450 N.E.2d at 943.

¹⁶ *In re Haymer*, 115 Ill. App. 3d 349, 355, 450 N.E.2d 940, 943 (1983); A. MORACZEWSKI & J. SHOWALTER, DETERMINATION OF DEATH 30 (1982).

¹⁷ Statutes in Arkansas, Connecticut (as part of its formulation of the Uniform Anatomical Gift Act), Nevada, North Carolina, Oklahoma, and West Virginia take this approach. See *supra* note 14. The Unif. Brain Death Act § 1, 12 U.L.A. 17 (Supp. 1985), recommended in 1978 by the National Conference of Commissioners on Uniform State Laws also employs a singular whole brain focus: "For legal and medical purposes, an individual who has sustained irreversible cessation of all functioning of the brain, including the brain stem, is dead. A determination under this section must be made in accordance with reasonable medical standards." Similarly, the Law Reform Commission of Canada proposed a statute that makes the irreversible cessation of all brain functions the sole definition of death. LAW REFORM COMMISSION OF CANADA, CRITERIA FOR THE DETERMINATION OF DEATH (1981).

¹⁸ The Unif. Determination of Death Act § 1, 12 U.L.A. 271 (Supp. 1985), provides:

definition. Twenty-six states and the District of Columbia have accepted this approach.¹⁹ Eight states retain the cardiopulmonary definition with the additional provision that when artificial means of sustaining respiration and heartbeat preclude application of the cardiopulmonary standard, a finding of whole brain death will suffice.²⁰ Numerous groups, including the American Bar Association, the American Medical Association, the American Academy of Neurology, the American Electroencephalographic Society, the National Conference of Commissioners on Uniform State Laws, and the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (hereinafter "President's Commission") have endorsed the Uniform Determination of Death Act's cardiopulmonary or whole brain based criteria.²¹ Despite the lack of universal acceptance of a single definition of death, law, medicine, and society at large have reached a consensus on the appropriateness of defining the death of the person to include the cessation of all functions of the whole brain.

Although some commentators have argued to the contrary,²²

"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 brain stem, is dead. A determination of death must be made in accordance with accepted medical standards."

¹⁹ Statutes of this type are in force in California, Colorado, The District of Columbia, Georgia, Idaho, Kansas, Maine, Maryland, Mississippi, Montana, New Mexico, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, and Wisconsin. States that have judicially recognized an alternative definition based upon either whole brain or cardiopulmonary criteria are Arizona, Illinois, Indiana, Nebraska, New Jersey, Massachusetts, and Washington. See *supra* note 14.

²⁰ Alabama, Alaska, Florida, Hawaii, Iowa, Louisiana, New York, and Texas apply this formulation, first advanced by Capron & Kass, *A Statutory Definition of the Standards for Determining Human Death: An Appraisal and a Proposal*, 121 U. PA. L. REV. 87 (1972). See *supra* note 14.

²¹ A. MORACZEWSKI & J. SHOWALTER, *supra* note 16, at 27-28.

²² See Dworkin, *Death in Context*, 48 IND. L.J. 623 (1973). Professor Dworkin argues that the determination of death must be made in the context of the particular case by determining whether treating the person as legally dead "seems [to be] the best thing to do." *Id.* at 636. He summarizes his position as follows:

[M]odern writers on death have failed to ask the most basic question about the death definition problem: What difference does it make whether somebody is dead? That question places the issue of death into the only posture in which it can be of relevance to the law—the posture of context or consequences. Whatever may be the needs of the philosopher or the ethicist, the lawyer needs only to know what consequences follow upon a given determination. Only if we are persuaded that one definition of death will *always* lead to the correct resolution of legal problems do we need to search for such a definition.

Id. at 628-29 (emphasis in original).

This "contextual" approach to death has not gained acceptance. Forty states and the District of Columbia have adopted uniform definitions of death that include whole brain death. See *supra* notes 14-16 and accompanying text. The President's Commission has recommended that the states move toward a uniform definition of death. PRESI-

defining death, and including brain-based criteria within the definition, offers several advantages. The President's Commission points out that a uniform definition will enhance ease and efficiency in transplanting donated organs. Removing vital organs from a whole brain dead donor within the limited time frame in which the donor's heart and lungs continue to function materially improves the recipient's chances for a successful transplant.²³ The President's Commission noted, however, that the concern over the determination of death rests less with any wish to facilitate organ transplantation than with the need both to render appropriate care to patients, and to replace artificial support with more fitting and respectful behavior when a patient has become a dead body.²⁴ A brain death standard also defeats the arguments advanced by criminal defendants that a physician's performance of a transplant breaks the chain of causation, thereby relieving the defendant of liability for homicide.²⁵

II

BEYOND WHOLE BRAIN DEATH: NEOCORTICAL DEATH

Although the whole brain definition of death prevails today, law and medicine must move forward to recognize a higher brain-neocortical formulation of death.²⁶ The balance of this Article ad-

DENT'S COMMISSION, *supra* note 4, at 51. In addition, a recently appointed federal Task Force on Organ Transplantation has recommended the passage of brain death laws in the states that have not yet recognized brain death. See *Legislation to Spur Organ Donations Urged*, Am. Med. News, Oct. 18, 1985, at 24, col. 1.

²³ See Schwartz, *Bioethical and Legal Considerations in Increasing the Supply of Transplantable Organs: From UAGA to "Baby Fae,"* 10 AM. J. LAW & MED. 397, 399 (1985).

²⁴ PRESIDENT'S COMMISSION, *supra* note 4, at 23-24.

²⁵ The Law and Medicine Committee of the American Bar Association notes other advantages:

This Committee states that the advantages of its simple direct definition are that it: permits judicial determination of the ultimate fact of death; permits medical determination of the evidentiary fact of death; avoids religious determination of any facts; avoids prescribing the medical criteria; enhances changing medical criteria; enhances local medicine practice tests; covers the three known tests ("brain, beat and breath tests"); covers death as a process (medical preference); covers death as a point in time (legal preference); avoids passive euthanasia; avoids active euthanasia; covers current American and European medical practices; covers both civil and criminal law; covers current American judicial decisions; avoids nonphysical sciences.

Veith, *Brain Death and Organ Transplantation*, 315 ANNALS OF N.Y. ACAD. OF SCI. 416, 430 (1978).

²⁶ As one court observed:

Now, however, we are on the threshold of new terrain—the penumbra where death begins but life, in some form, continues. We have been led to it by the medical miracles which now compel us to distinguish between "death," as we have known it, and death in which the body lives in some fashion but the brain (or a significant part of it) does not.

Severns v. Wilmington Med. Center, Inc., 421 A.2d 1334, 1344 (Del. 1980). Dr. A. Earl

dresses why the consensus favoring the whole brain definition must ultimately erode and then considers the implications of recognizing neocortical death as legal death.

A person may suffer an irreversible loss of consciousness and cognition, the earmarks of higher brain activity, without losing brain stem functions.²⁷ Under a neocortical definition, a patient in this noncognitive persistent vegetative state is dead.²⁸ The patient would not be considered dead under a whole brain death standard because the brain stem, the portion of the lower brain that regulates vegetative functions such as breathing, blood pressure, temperature, and neuroendocrine control, would continue to function.²⁹ For example, victims of cardiac or respiratory arrest, asphyxiation, stroke, or head trauma may become neocortically dead but not whole brain dead. This condition can occur when deprivation of circulatory or respiratory functions occurs for a period of time brief enough to spare the brain stem but long enough to cause permanent damage to the cerebrum.³⁰ Vegetative patients who are neocortically dead can remain biologically alive with intravenous feeding and antibiotics for much longer periods of time than pa-

Walker, a renowned neurosurgeon, notes: "After the concept of brain death has been introduced and generally accepted, the question was raised in philosophical and medical discussions as to whether the lack of function of an essential part of the central nervous system might not be considered as death These philosophical issues may become the medical problems of the future. Obviously the concept of brain death has opened a Pandora's box that will trouble mankind for a long time." Walker, *supra* note 5, at 261. See also Tomlinson, *The Conservative Use of the Brain-Death Criterion—A Critique*, 9 J. MED. & PHIL. 377, 389 (1984); Walker, *Dead or Alive*, 172 J. NERVOUS & MENTAL DISEASE 639 (1984).

²⁷ See Dougherty, Rawlinson, Levy & Plum, *Hypoxia-Ischemic Brain Injury and the Vegetative State: Clinical and Neuropathologic Correlation*, 31 NEUROLOGY 991 (1981) [hereinafter cited as Dougherty]; Ingvar, *supra* note 6; Ladanyi, *supra* note 6.

²⁸ See *supra* note 6.

²⁹ See *supra* note 5.

³⁰ See Levy, Caronna, Singer, Lapinski, Frydman & Plum, *Predicting Outcome From Hypoxic-Ischemic Coma*, 253 J. A.M.A. 1420 (1985) [hereinafter cited as Levy]; Levy, Bates, Caronna, Cartledge, Knill-Jones, Lapinski, Singer, Shaw & Plum, *Prognosis in Nontraumatic Coma*, 94 ANNALS OF INTERNAL MED. 293 (1981); Cranford & Smith, *Some Critical Distinctions Between Brain Death and Persistent Vegetative State*, 6 ETHICS SCI. & MED. 199-209 (1979); Dougherty, *supra* note 27 (dissemination of training in cardiopulmonary resuscitation may be increasing incidence of persistent vegetative state relative to incidences of whole brain and cardiopulmonary death); Pampiglione, Chaloner, Harden & O'Brien, *Transitory Ischemia/Anoxia in Young Children and the Prediction of Quality of Survival*, 315 ANNALS OF N.Y. ACAD. OF SCI. 281, 283-84 (1978).

An estimated 10,000 patients in the United States are neocortically dead but are being kept biologically alive by artificial means. Am. Med. News, Mar. 28, 1986, at 1, col. 1; Goodman, *When the Choice Is Irreversible Coma or Turning Off the Feeding Tube*, Boston Globe, June 13, 1985, at 27; Mancusi, *Karen Ann Quinlan's Legacy: Questions On Dying That Have Yet to be Answered*, Boston Globe, June 13, 1985, at 3. A 1978 study estimated that in Japan 2,000 to 3,000 permanently vegetative patients were being cared for out of a population of 100 million persons. Sato, Ueki, Arai, *Epidemiological Survey of Vegetative Patients in Tokoku District of Japan*, 8 NEUROLOGIA MEDICO-CHIRURGICA (Tokyo) 141-45 (1978).

tients who have sustained whole brain death.³¹ Although heart and lung functions typically cease within hours or a few days after whole brain death,³² cardiopulmonary activities can continue for many years in neocortically dead patients.³³ Karen Ann Quinlan's situation is the most familiar example of this phenomenon.³⁴

Neocortical death destroys critical elements of the central nervous system, leaving the person in an irreversible condition without awareness, thought, or feelings.³⁵ Deprived of higher brain functions, the patient does not purposefully react to external stimuli.³⁶ A patient may yawn, sigh, react to light, breathe, and maintain a heartbeat. These responses are, however, merely physiologic reflexes.³⁷ As Younger and Bartlett concluded: "Despite the continued ability to spontaneously integrate vegetative functions, a patient who has irreversibly lost the capacity for consciousness and cognition is dead. What remains alive is only a mindless organism."³⁸ Many medical ethics commentators agree that patients who experience neocortical death and fall into a persistent vegetative state should be treated as brain dead.³⁹

³¹ See Ingvar, *supra* note 6, at 196-97. See also *Guinness Book of World Records* 35 (N. McWhirter ed. 1984) ("The longest recorded coma was that of Elaine Esposito (b. Dec. 3, 1934) of Tarpon Springs, Fla. She never stirred after an appendectomy on Aug. 6, 1941, when she was six, in Chicago. She died Nov. 25, 1978, aged 43 years 357 days, having been in a coma for 37 years 111 days.").

³² Black, *Brain Death*, 299 *NEW ENG. J. MED.* 338-44 (1978); Ingvar, *supra* note 6.

³³ See *supra* note 31.

³⁴ In 1975 Karen Ann Quinlan lapsed into an irreversible persistent vegetative state. On June 11, 1985, Ms. Quinlan was pronounced dead after cessation of heart and lung functions. See *Quinlan Case*, *N.Y. Times*, June 13, 1985, at 24, col. 1.

³⁵ F. PLUM & J. POSNER, *supra* note 6; Korein, *supra* note 6, at 8; Younger & Bartlett, *supra* note 4, at 256.

³⁶ Korein, *supra* note 6, at 8.

³⁷ Younger & Bartlett, *supra* note 4, at 256.

³⁸ *Id.* See Goodman, *supra* note 30, at 27:

The million dollar courtroom drama had finally closed. The jet-setting Dane, the raven-haired mistress, the German-born maid, the vengeful stepchildren, had taken their curtain calls.

Life had changed for all the cast members of the von Bülow play except for one: Sunny. She spent the day after her husband's acquittal like all others in the half-life of irreversible coma. She lay in a bed behind the guarded door of the \$725-a-day room in Columbia Presbyterian Hospital in New York City.

For the 1,632nd day she did not see anything or hear anything or feel anything or taste anything. The physical therapist came in to exercise her limbs and to turn her from one side to the other to prevent bedsores. Her hair was combed, makeup applied, teeth brushed. Her 80-pound body was fed through a tube.

³⁹ See Fletcher, *New Definitions of Death*, *PRISM* (1974); Gert, *Personal Identity and the Body*, 10 *DIALOGUE* 458 (1971); R. VEATCH, *DEATH, DYING AND THE BIOLOGICAL REVOLUTION: OUR LAST QUEST FOR RESPONSIBILITY* 71-75 (1976); Engelhardt, *Medicine and the Concept of Person*, in *CONTEMPORARY ISSUES IN BIOETHICS* 94 (T. Beauchamp & L. Walters eds. 1982); Engelhardt, *Defining Death: A Philosophical Problem for Medicine and Law*, 112

A neocortical death formulation hinges on the centrality of consciousness and cognition as the quintessential attributes of human life. Jacob Bronowski's elegant study, *The Ascent of Man*,⁴⁰ expresses the concept from the standpoint of a scientist and humanist:

Man is a singular creature. He has a set of gifts which make him unique among the animals: so that, unlike them, he is not a figure in the landscape—he is a shaper of the landscape. . . .

. . . .

. . . Among the multitude of animals which scamper, fly, burrow and swim around us, man is the only one who is not locked into his environment. His imagination, his reason, his emotional subtlety and toughness, make it possible for him not to accept the environment but to change it. . . .

. . . Man is distinguished from other animals by his imaginative gifts. He makes plans, inventions, new discoveries, by putting different talents together; and his discoveries become more subtle and penetrating

. . . .

. . . How did the hominids come to be . . . dexterous, observant, thoughtful, passionate, able to manipulate in the mind the symbols of language and mathematics both, the visions of art and geometry and poetry and science?⁴¹

Pascal's metaphor of a man as a *roseau pensant*, a thinking reed, is perhaps the most vivid articulation of the cerebral quality of human life: "Man is a reed, a bit of straw, the feeblest thing in nature. But he thinks. His is a thinking reed Man's dignity, our dignity, lives in our thoughts. Thereby we rise. Only thereby . . . A thinking reed. Not in space am I to seek my dignity. But in my thinking."⁴²

AM. REV. RESPIRATORY DISEASE 587 (1975); Green & Wikler, *Brain Death and Personal Identity*, 9 PHIL. & PUB. AFF. 105, 131 (1980); Olinger, *Medical Death*, 27 BAYLOR L. REV. 22, 24 (1975); Puccetti, *The Conquest of Death*, 59 THE MONIST 252 (1976); Rosenfeld, *The Heart, the Head and the Halakah*, 70 N.Y. ST. J. MED. 2615 (1970); Veatch, *The Whole-Brain-Oriented Concept of Death: An Outmoded Philosophical Formulation*, 3 J. THANATOLOGY 13 (1975); Younger & Bartlett, *supra* note 4; *Redefining Death: Technology and Transplants Complicate Life's Final Certainty*, Washington Post, Nov. 20, 1985, at 7, col. 1. *But see* D. LAMB, DEATH, BRAIN DEATH, AND ETHICS 45 (1985).

⁴⁰ J. BRONOWSKI, *THE ASCENT OF MAN* (1973).

⁴¹ *Id.* at 19-30.

⁴² B. PASCAL, *PENSÉES* (1965) (Nos. 349 & 348). *See also* ARISTOTLE, *NICOMACHEAN ETHICS* 265 (1962) ("Now, in the case of animals, life is defined by their capacity for sense perception, and in the case of man by the capacity for sense perception or for thought. But a capacity is traced back to its corresponding activity, and it is activity that counts. Consequently, life in the true sense is perceiving or thinking."); R. DESCARTES, *DISCOURSE ON METHOD* 28 (1910) ("I think, therefore I am." [*Cogito ergo sum*]); Rabin & Rabin, *Credo for Creeping Paralysis: Cogito Ergo Sum*, in *TO PROVIDE SAFE PASSAGE: THE HUMANISTIC ASPECTS OF MEDICINE* 48, 52 (P. Rabin & D. Rabin eds. 1985) ("Victims of ALS [amyotrophic lateral sclerosis] can take heart in the motto *cogito ergo sum*"); L.

If neocortical functions—the capacity to think, feel, communicate, or experience our environment—are the key to human life, then the loss of neocortical functions should be the key to human death. If the irreversible loss of an organism's essentially significant attributes characterizes death, and if in humans the significant attributes are the capacity for consciousness and higher cortical functions rather than for autonomic bodily integration, then people who have irreversibly lost these distinguishing features of human life should be treated as dead.⁴³ The late Senator Jacob Javits, while suffering from a terminal illness, agreed: "Because medical technology can now sustain life even when the ability to think is gone, society must change its laws."⁴⁴

Biological existence following neocortical death raises several problems for law and medicine. Perhaps the most troubling question raised in cases involving patients who have lost higher brain functions is whether withdrawing artificial life-support (respirator and drug therapy regimes) and feeding (intravenous or nasogastric nourishment) is justified. A growing number of cases⁴⁵ and statutes⁴⁶ now permit withholding or completely withdrawing life-sustaining treatment and, more recently, nourishment, from patients who have irreversibly lost all cognitive functions. In a landmark statement of policy, on March 15, 1986, the American Medical Association's Council on Ethical and Judicial Affairs unanimously approved a new ethics principle that authorizes physicians to withhold or withdraw all means of life-prolonging treatment, including food and water, from terminal or irreversibly comatose patients, even when death is not imminent.⁴⁷ By permitting the dispensation of

CARROLL, ALICE'S ADVENTURES IN WONDERLAND 14 (Oxford 1982) (After consuming the bottle labeled "DRINK ME" and shrinking to a height of ten inches, Alice contemplates her fate: "[S]he waited for a few minutes to see if she was going to shrink any further: she felt a little nervous about this; 'for it might end, you know,' said Alice, (in my going out altogether, like a candle. I wonder what I should be like then?' And she tried to fancy what the flame of a candle is like after it is blown out, for she could not remember ever having seen such a thing."). In a sense Carroll's simile expresses the essence of what occurs when a human being forever loses the ability to think: the candle is blown out. Interestingly, Carroll repeats this idea in a more direct reference to death when Tweedledum tells Alice that she is only a character in the Red King's dream and "[i]f that there King was to wake . . . you'd go out—bang!—just like a candle!" L. CARROLL, THROUGH THE LOOKING GLASS 168 (Oxford 1982).

⁴³ Veatch, *The Definition of Death: Ethical, Philosophical, and Policy Confusion*, 315 ANNALS OF N.Y. ACAD. OF SCI. 307, 312-13 (1978).

⁴⁴ *Former Senator Pleads For Dignified Death*, Am. Med. News, Oct. 25, 1985, at 13, col. 2. "[Javits] believes that a 'test' of an individual's mind should be the deciding factor. 'The more I thought about a test [of mental competence] the more I believed it had worth for serious consideration.'" *Id.* at 14, col. 4.

⁴⁵ See *infra* notes 48-82 and accompanying text.

⁴⁶ See *infra* note 83 and accompanying text.

⁴⁷ See *infra* note 139 and accompanying text.

biological death to irreversibly noncognitive patients, these authorities and developments raise the question of the appropriateness of accepting a new legal definition of death based on a patient's irreversible loss of consciousness and cognitive functions.

The *Quinlan* case⁴⁸ and its progeny⁴⁹ recognize that an incompetent patient has a right of privacy which may be exercised by substitute decisionmakers. This right to privacy includes the right to terminate or refuse life-sustaining care. Although the right to privacy/right to die rationale originated in cases involving irreversibly noncognitive patients, the rationale has been extended to terminally ill, old, and mentally impaired patients.⁵⁰ This Article deals with the proper approach to death and only peripherally with the separate question of withdrawal or refusal of treatment in cases involving persons who are conscious and cognitive but terminally ill and perhaps elderly or retarded.⁵¹ Giving legal recognition to neocortical

⁴⁸ *In re Quinlan*, 70 N.J. 10, 355 A.2d 647, cert. denied, 429 U.S. 922 (1976).

⁴⁹ *E.g.*, *Foody v. Manchester Memorial Hosp.*, 40 Conn. Supp. 127, 133, 482 A.2d 713, 720 (Super. Ct. 1984); *Severns v. Wilmington Medical Center, Inc.*, 421 A.2d 1334, 1347 (Del. 1980); *John F. Kennedy Memorial Hosp., Inc. v. Bludworth*, 452 So. 2d 921, 924 (Fla. 1984); *In re P.V.W.*, 424 So. 2d 1015, 1020 (La. 1982); *In re Spring*, 380 Mass. 629, 633-34, 405 N.E.2d 115, 119 (1980); *Superintendent of Belchertown State School v. Saikewicz*, 373 Mass. 728, 740-45, 370 N.E.2d 417, 823-25 (1977); *In re Torres*, 357 N.W.2d 332, 329-40 (Minn. 1984); *In re Conroy*, 98 N.J. 321, 356-60, 486 A.2d 1209, 1227-29 (1985); *Eichnor v. Dillon*, 73 A.D.2d 431, 458-59, 426 N.Y.S.2d 517, 539 (1980), *aff'd sub nom. In re Storar*, 52 N.Y.2d 363, 376-77, 420 N.E.2d 64, 70-71, 438 N.Y.S.2d 266, 272-73, cert. denied sub nom. *Storar v. Storar*, 454 U.S. 858 (1981); *Leach v. Akron Gen. Medical Center*, 68 Ohio Misc. 1, 7-9, 426 N.E.2d 809, 812-13 (C.P. 1980); *In re Colyer*, 99 Wash. 2d 114, 119-22, 660 P.2d 738, 741-43 (1983).

⁵⁰ *See, e.g., In re Spring*, 380 Mass. 629, 405 N.E.2d 115 (1980) (family allowed to terminate life-sustaining hemodialysis treatment being administered to 78-year-old patient who, although conscious and capable of limited cognitive functions, suffered from senility); *Superintendent of Belchertown State School v. Saikewicz*, 373 Mass. 728, 370 N.E.2d 417 (1977) (court approved guardian's decision to withhold chemotherapy treatment from 67-year-old incompetent patient with I.Q. of 10 and mental age of approximately two years and eight months who suffered from acute leukemia); *In re Hier*, 18 Mass. App. Ct. 200, 464 N.E.2d 959 (upholding probate judge's determination of substituted judgment that seriously ill 92-year-old incompetent person with history of mental illness would, if competent, decline surgical procedures necessary for reinsertion of feeding tube), *appeal denied*, 392 Mass. 1102, 465 N.E.2d 261 (1984).

⁵¹ Some critics have suggested that treating irreversibly noncognitive patients as dead is the first step on a "slippery slope" that will eventually justify active euthanasia or abortion. *See, e.g., D. LAMB, supra note 39, at 42-43; PRESIDENT'S COMMISSION, supra note 4, at 40; Beresford, Cognitive Death: Differential Problems and Legal Overtones*, 315 ANNALS OF N.Y. ACAD. OF SCI. 339, 340-41 (1978). This argument is incorrect and misleading. Patients with severely impaired cognitive abilities, e.g., Alzheimer's disease, nevertheless retain consciousness and have the capacity to think or listen to Mozart. A person with dementia or an unborn fetus possesses the potential capacity to think and, therefore, is not dead. St. Thomas Aquinas noted the importance of this concept in his *Summa Theologiae*: "Every kind of being is divided into potentiality and act Now it is noticeable that whatever has a soul is not always actual in the sense of vitally acting; so in the soul's definition it is said that it is the act of a body having life potentiality . . ." ST. THOMAS AQUINAS, AN AQUINAS READER 215-16 (Image 1972). Thus, rather than undermine the

death, however, could advance the analysis of the sensitive issue of forgoing or withdrawing nourishment and artificial life-support systems in cases involving incompetent terminally ill patients (infants and adults) who nevertheless retain cognitive functions by forcing physicians and families to focus on the distinction between patients who are conscious and alive, and patients who are irreversibly noncognitive and, therefore, dead.

The case for redefining death becomes compelling when one examines the logic and results of the right to privacy/right to die cases. In *Barber v. Superior Court*,⁵² a California Court of Appeals issued a writ of prohibition to bar the prosecution of two physicians charged with murder for discontinuing life-support equipment and intravenous feeding of an irreversibly noncognitive adult patient.⁵³ The court held that the physicians' withdrawal of further treatment at the written request of the patient's wife was not unlawful even though the physicians knew that their intentional omission would result in the death of the patient.⁵⁴ *Barber's* importance lies in the court's refusal to apply homicide laws to the intentionally caused death of a patient who, although neocortically dead, was a living person under whole brain death law.

In *In re Conroy*⁵⁵ the New Jersey Supreme Court ruled that an incompetent, yet cognitive, institutionalized, eighty-four year old patient with severe and permanent mental and physical impairments and a life expectancy of approximately one year could be disconnected from all life-sustaining treatment and nourishment (nasogastric feeding tube) if the patient would have desired such a decision. *Conroy* is significant for two reasons. First, in approving cessation of nourishment, the court equated nasal tube feeding to artificial

personhood status of the senile, severely sick or unborn, a neocortical approach to death strengthens the case for human rights in these settings by stressing consciousness and the capacity for thinking as the essential test for dispensing or defining death. By contrast, alternative formulations that focus on other values such as privacy, quality of life, or the perceived best interests of the patient do not prevent patients (or the unborn) from being put to death even though there may be the presence or potential for consciousness. Recognizing neocortical death does not, however, rule out terminating or withdrawing care from patients who retain consciousness and limited cognitive functions. With legal death properly defined to include neocortical death, medical decisionmakers can directly face the distinct issue of withholding or terminating life-saving measures from patients who are alive and sapient but afflicted by terminal illness, chronic pain, extremely diminished cognitive abilities, or a limited life expectancy.

⁵² 147 Cal. App. 3d 1006, 195 Cal. Rptr. 484 (1983).

⁵³ The court described the issue presented: "We deal here with the physician's responsibility in a case of a patient who, though not 'brain dead,' faces an indefinite vegetative existence without any of the higher cognitive brain functions." *Id.* at 1013, 195 Cal. Rptr. at 488.

⁵⁴ *Id.* at 1021-22, 195 Cal. Rptr. at 493.

⁵⁵ 98 N.J. 321, 486 A.2d 1209 (1985).

breathing induced by a respirator.⁵⁶ The court rejected any distinction between actively hastening death by terminating treatment and passively allowing a person to die of disease. Second, the court authorized termination of all life-support measures for a terminally ill patient who retained consciousness and limited cognitive functions⁵⁷ and was, therefore, not dead under whole brain or neocortical standards.

The court reversed an appeals court ruling⁵⁸ that had denied termination on the ground that the right to terminate life-sustaining treatment on the basis of a guardian's judgment was limited to incurable and terminally ill patients who were whole brain dead or neocortically dead and who would gain no medical benefit from continued treatment.⁵⁹ Finding a common law right of privacy and self-determination to decline or terminate medical procedures for both competent and incompetent patients, the New Jersey Supreme Court ruled that incompetent patients should have the right to discontinue life-support and feeding regimens.⁶⁰ According to the court, the guardians must seek to determine whether the incompetent patient would have desired termination on the basis of one of three standards: subjective (clear evidence that the patient would have refused treatment under the circumstances involved, e.g., living will or oral statements); limited objective (some trustworthy evidence of what the patient would have desired plus satisfactory proof that the burdens of the patient's life with the treatment outweigh the benefits); and pure objective (net burdens of life clearly outweigh benefits, and pain makes further treatment inhumane).⁶¹ The court held that the evidence at trial was inadequate to satisfy any of the tests, and a new trial would have been necessary had the patient, Claire Conroy, lived. Claire Conroy died while the case was on appeal, but the New Jersey courts decided to resolve the issues presented by the case because of their significant public importance.⁶²

Several cases from the state of Washington further illustrate the trend toward accepting private decision to forgo treatment for patients who are neocortically dead. In *In re Bowman*,⁶³ Washington accepted whole brain death as the test for legal death. In *Bowman*,

⁵⁶ *Id.* at 369-74, 486 A.2d at 1233-37.

⁵⁷ *Id.* at 336-38, 486 A.2d at 1216-17.

⁵⁸ *In re Conroy*, 190 N.J. Super. 453, 464 A.2d 303 (App. Div. 1983).

⁵⁹ *Id.* at 466, 464 A.2d at 310.

⁶⁰ *In re Conroy*, 98 N.J. 321, 356-60, 486 A.2d 1209, 1227-29 (1985).

⁶¹ *Id.* at 360-68, 486 A.2d at 1229-33.

⁶² *Id.* at 341-42, 486 A.2d at 1219.

⁶³ 94 Wash. 2d 407, 421, 617 P.2d 731, 738 (1980). See Tyler & Robertson, *Impact of the Brain Death Ruling in Washington State*, 140 W.J. MED. 625 (1984).

the court stated that it was not deciding "the much more difficult question of whether life support mechanisms may be terminated while a person is still alive but in . . . a 'persistent vegetative state.'"⁶⁴ In the 1983 case *In re Colyer*,⁶⁵ however, the Washington Supreme Court answered this issue in the affirmative.⁶⁶ The same court reached a similar result in *In re Hamlin*,⁶⁷ a case that involved an irreversibly noncognitive patient in a persistent vegetative state who had no family and, unlike the patient in *Colyer*, had been incompetent his entire life.

In *In re L.H.R.*,⁶⁸ the Georgia Supreme Court considered "under what circumstances may life-support systems be removed from a terminally ill patient existing in a chronic vegetative state with no hope of development of cognitive function."⁶⁹ *L.H.R.* involved an infant born in a chronic vegetative state with no hope of developing cognitive functions.⁷⁰ Eighty-five to ninety percent of the infant's brain tissue had been destroyed, and a neurologist described her condition as irreversible.⁷¹ The court determined that the infant's parents or legal guardian could exercise the right to refuse treatment after a diagnosis that the infant was terminally ill with no hope of recovery and was in a chronic vegetative state with no reasonable possibility of attaining cognitive function.⁷² In cases involving the irreversible loss of cognitive functions, the court found no legal difference between an infant and an incompetent adult who has made no living will.⁷³ Accordingly, the court extended its holding to terminally ill incompetent adults who are in a chronic vegetative state with no reasonable possibility of regaining cognitive functions.⁷⁴

Cases in Connecticut,⁷⁵ Delaware,⁷⁶ Florida,⁷⁷ Louisiana,⁷⁸

⁶⁴ 94 Wash. 2d at 413, 617 P.2d at 735.

⁶⁵ 99 Wash. 2d 114, 660 P.2d 738 (1983).

⁶⁶ *Id.* at 136, 660 P.2d at 750. The Washington Supreme Court later summarized the *Colyer* holding: "[T]he guardian of a person in a chronic, persistent vegetative state could consent to the withdrawal of life support systems, at least where the family, the treating physicians, and a physician's prognosis board agree as to the proper treatment." *In re Ingram*, 102 Wash. 2d 827, 835, 689 P.2d 1363, 1367 (1984).

⁶⁷ 102 Wash. 2d 810, 689 P.2d 1372 (1984).

⁶⁸ 253 Ga. 439, 321 S.E.2d 716 (1984).

⁶⁹ *Id.*, 321 S.E.2d at 717-18.

⁷⁰ *Id.*, 321 S.E.2d at 718.

⁷¹ *Id.*

⁷² *Id.* at 446, 321 S.E.2d at 722-23.

⁷³ *Id.* at 446-47, 321 S.E.2d at 722-23.

⁷⁴ *Id.* at 447, 321 S.E.2d at 723.

⁷⁵ *E.g.*, *Foody v. Manchester Memorial Hosp.*, 40 Conn. Supp. 127, 482 A.2d 713 (Super. Ct. 1984) (family of irreversibly noncognitive patient granted injunctive relief to restrain hospital personnel and physicians from continuing use of artificial devices to maintain cardiopulmonary functions).

⁷⁶ *E.g.*, *Severns v. Wilmington Medical Center, Inc.*, 421 A.2d 1334 (Del. 1980)

Massachusetts,⁷⁹ Minnesota,⁸⁰ New York,⁸¹ and Ohio⁸² have also sanctioned efforts to withdraw artificial life-support machinery from irreversibly noncognitive infants and adults. Moreover, three states have passed natural death statutes providing for withdrawal of life-sustaining treatment for patients who are diagnosed as unconscious with no reasonable possibility of returning to a cognitive sapient state.⁸³

The development of a distinct right to die jurisprudence, accompanied by the New Jersey Supreme Court's elimination of any distinction between nourishment and other forms of artificial life-support measures in *In re Conroy*,⁸⁴ has prompted efforts to terminate the feeding of patients in a persistent vegetative state with no hope of regaining consciousness even if the patient is not terminally ill and does not require life-support machines. For example, a recent Massachusetts probate court case involved a wife's efforts to compel a hospital to cease administering food and water to her irreversibly unconscious husband, Paul Brophy.⁸⁵ A neurological evaluation demonstrated that, following Mr. Brophy's cerebral aneurysm in 1983,⁸⁶ he was able to breathe and maintain his own heartbeat,

(husband of irreversibly unconscious wife could be appointed guardian for purposes of removing life-sustaining machinery).

⁷⁷ *E.g.*, John F. Kennedy Memorial Hosp., Inc. v. Blutworth, 452 So. 2d 921 (Fla. 1984) (where irreversibly unconscious adult has executed "living" or "mercy" will, family members may terminate life-support procedures without prior court approval); *In re Barry*, 445 So. 2d 365 (Fla. Dist. Ct. App. 1984) (parents of terminally ill infant in permanent vegetative state with no cognitive functions granted court approval to terminate child's life-support systems).

⁷⁸ *E.g.*, *In re P.V.W.*, 424 So. 2d 1015 (La. 1982) (parents authorized to discontinue life-support systems of severely brain damaged, irreversibly comatose, respirator-dependent newborn infant).

⁷⁹ *E.g.*, *In re Dinnerstein*, 6 Mass. App. Ct. 466, 380 N.E.2d 134 (1978) (validating order not to resuscitate irreversibly noncognitive vegetative patient with acute Alzheimer's disease).

⁸⁰ *E.g.*, *In re Torres*, 357 N.W.2d 332 (Minn. 1984) (conservator authorized to terminate life-sustaining respirator treatment of irreversibly noncognitive unconscious adult patient).

⁸¹ *E.g.*, *Eichner v. Dillon*, 73 A.D.2d 431, 426 N.Y.S.2d 517 (1980) (guardian of 83-year-old irreversibly noncognitive patient in chronic persistent vegetative state granted authority to terminate patient's respirator), *aff'd sub nom. In re Storar*, 52 N.Y.2d 363, 420 N.E.2d 64, 438 N.Y.S.2d 266, *cert. denied sub. nom. Storar v. Storar*, 454 U.S. 858 (1981).

⁸² *E.g.*, *Leach v. Akron Gen. Medical Center*, 68 Ohio Misc. 1, 426 N.E.2d 809 (C.P. 1980) (guardian of terminally ill adult in permanent vegetative state authorized to discontinue all life-support systems).

⁸³ *See* N.C. GEN. STAT. § 90-322 (1985); OR. REV. STAT. § 97.083 (1984); VA. CODE § 54-325.8:6 (Supp. 1985).

⁸⁴ 98 N.J. 321, 369-74, 486 A.2d 1209, 1233-37 (1985).

⁸⁵ *Brophy v. New England Sinai Hosp., Inc.*, No. 85-E0009-G1, slip op. (P. & Fam. Ct. Dep't, Norfolk Div., Dedham, Mass. Oct. 21, 1985), *appeal transferred to Supreme Judicial Court* (No. 86-162, Feb. 14, 1986).

⁸⁶ *Id.* at 5-7.

but he was totally incapable of thought or consciousness.⁸⁷ Expert physicians testified that removing the stomach tube that provided nourishment would cause Brophy's death in one to three weeks.⁸⁸ Mrs. Brophy's suit attracted national attention⁸⁹ because the case was the first attempt to persuade a court to order removal of a feeding tube from a permanently vegetative but not terminally ill patient.⁹⁰

On October 21, 1985, Probate Justice David Kopelman rendered judgment permanently enjoining the hospital, its physicians, and its staff from removing or clamping Mr. Brophy's feeding tube for the purpose of denying hydration and nutrition.⁹¹ The court also permanently enjoined Mrs. Brophy from authorizing any other medical facility to discontinue nutrition and hydration should Mr. Brophy be transferred from the hospital to a nursing home.⁹²

In rejecting Mrs. Brophy's attempt to obtain judicial approval to discontinue feeding, the court relied upon a number of evidentiary and legal factors. First, the court expressed misgivings as to whether Brophy was completely unconscious.⁹³ Despite the use of qualified language,⁹⁴ the court nevertheless concluded that the patient was in a persistent vegetative state and that it was highly unlikely that Brophy would ever regain cognitive abilities.⁹⁵ Second,

⁸⁷ *Id.* at 9-12. Dr. Ronald Cranford, chairman of the Ethics and Humanities Committee of the American Academy of Neurology, described Mr. Brophy's condition: "He is in a permanent vegetative state. There's no possibility he will recover. He is no more capable of experiencing pain than someone who is in a coma, brain-dead or dead." Mancusi, *Wife Asks Feeding Tube to be Removed*, Boston Globe, May 9, 1985, at 28, col. 6.

⁸⁸ *Brophy*, slip op. at 28.

⁸⁹ See Mancusi, *supra* note 87.

⁹⁰ Although the New Jersey Supreme Court eliminated any distinction between nourishment and other types of life-support systems in *In re Conroy*, 98 N.J. 321, 486 A.2d 1209 (1985), the *Conroy* court described the patient as "an elderly nursing-home resident who is suffering from serious and permanent mental and physical impairments, who will probably die within approximately one year even with the treatment." *Id.* at 342, 486 A.2d at 1219 (footnote omitted).

⁹¹ *Brophy*, slip op. (judgment granting permanent injunction).

⁹² *Id.*

⁹³ The court heard testimony from Dr. John F. Sullivan, Chief of Neurology at New England Medical Center, that Brophy "may be in a 'locked-in state,' which means that he may have some sensory appreciation of what is happening around him, but is unable to render a motor response to his environment because the pathways controlling voluntary motor responses are paralyzed." *Id.* at 11. The existence of a "locked-in" condition, *see supra* note 6, can now be clinically established or ruled out. *See infra* note 158.

⁹⁴ The court repeatedly expressed its "findings of fact" regarding Brophy's consciousness in tentative and equivocating terms. For example, the court stated that: "It is *probable* that such actions [movement in response to stimuli] are reflexive in nature, rather than the result of cognitive activity. . . . He *appears* incapable of either verbal or non-verbal communication." *Brophy*, slip op. at 12 (emphasis added).

⁹⁵ The court stated that it was "highly unlikely that [Brophy] will ever regain cognitive behavior, the ability to communicate, or the capability of interacting purposefully with his environment." *Id.*

the court found that the gastrostomy tube method of furnishing food and water posed no serious risks of pain or other discomfort,⁹⁶ while pain from the withdrawal of food and water could not be ruled out.⁹⁷ The court's unwillingness to declare that Mr. Brophy was completely noncognitive arguably provided a sufficient basis to deny the requested relief. If the patient is in a "locked-in" syndrome,⁹⁸ or can think or feel at some meaningful level, the argument for terminating feeding becomes much more troublesome.

The *Brophy* court, however, found a different basis for enjoining removal of the feeding tube. Even though Brophy had previously told his family that he did not want to be kept alive artificially should his condition become hopeless,⁹⁹ the court concluded that this wish was outweighed by "the most significant of the asserted State interests . . . the preservation of human life."¹⁰⁰ The court held that the fundamental right to refuse intrusive medical treatment must be subordinated to the state's interest in preserving human life when the patient is not terminally ill, the patient has not reached the end of his normal span of years, and the treatment is not highly invasive or painful.¹⁰¹ The court stated that if Brophy was terminally ill or dying, "it might . . . be permissible to remove the feeding tube."¹⁰² The court also rejected any effort to justify termination of feeding on quality of life grounds. "Otherwise," the judge observed, "the Court is pronouncing judgment that Brophy's life is not worth preserving. The quality of life is an incorrect focus because there are no manageable criteria for making such a judgment."¹⁰³

The probate court will not, however, have the final word on Mrs. Brophy's request. On February 14, 1986, the Supreme Judicial Court of Massachusetts *sua sponte* transferred the *Brophy* appeal for hearing by that court without waiting for a decision by the intermediate appellate court.¹⁰⁴

Regardless of the ultimate resolution of the *Brophy* case on ap-

⁹⁶ *Id.* at 18, 30, 36.

⁹⁷ *Id.* at 29. The court's refusal to find Brophy irreversibly unconscious based upon the court's erroneous perception that the possibility of a "locked-in" condition could not be eliminated, *see supra* notes 93, 94 and *infra* note 158, led the court to conclude that it could not medically exclude the potential for experiencing pain. Unlike a patient in a locked-in state, however, a neocortically dead patient has no capacity to experience pain or suffering. *See supra* notes 35-38 & 87 and accompanying text; *infra* text accompanying note 117.

⁹⁸ *See supra* note 6.

⁹⁹ *Brophy*, slip op. at 24-25. *See also* ABC News 20/20, "Dad Would Want To Die," Show No. 546, at 2-4 (Dec. 5, 1985).

¹⁰⁰ *Brophy*, slip op. at 40.

¹⁰¹ *Id.* at 40-42.

¹⁰² *Id.* at 43.

¹⁰³ *Id.* at 42.

¹⁰⁴ The appeal is docketed No. 86-162 in the Supreme Judicial Court.

peal, the lower court's opinion raises several important questions. First, what difference is there between a request to discontinue feeding via a tube into the patient's stomach and a request to discontinue supplying air or blood flow? *In re Conroy*¹⁰⁵ and *Barber v. Superior Court*¹⁰⁶ suggest, contrary to *Brophy*, that no real difference exists. The result in *Brophy* is somewhat surprising in that a prior Massachusetts Appeals Court case permitted physicians to forgo abdominal surgery on an elderly mentally ill patient who needed to have a feeding tube surgically inserted.¹⁰⁷ Feeding through a stomach tube is just as artificial and invasive as other forms of life-support that courts have allowed to be withdrawn from irreversibly unconscious patients.

A second question raised by *Brophy* is whether in dealing with a permanently brain damaged patient in a persistent vegetative state the presence of some terminal illness *other* than brain damage should make a difference. Several cases outside of Massachusetts have treated irreversible unconsciousness alone as sufficient to justify terminating treatment.¹⁰⁸ Other courts have characterized irreversible unconsciousness as a terminal illness.¹⁰⁹ *Brophy*, however, made no reference to these cases. The *Brophy* court attempted to distinguish prior Massachusetts decisions permitting termination of treatment by noting that those cases involved either terminally ill (as opposed to vegetative) patients or procedures that, unlike feeding, were extremely invasive.¹¹⁰

Finally, *Brophy* raised the question whether a patient in a persistent vegetative state is a "human life" so as to implicate the state's paramount interest in preserving human life. This issue is fundamental because if such a patient is not a "human life," the first two questions become irrelevant. Instead of confronting this question directly, however, the *Brophy* court merely asserted the state's interest in preserving human life as the principal factor affecting the de-

¹⁰⁵ 98 N.J. 321, 369-74, 486 A.2d 1209, 1233-37 (1985).

¹⁰⁶ 147 Cal. App. 3d 1006, 1016-17, 195 Cal. Rptr. 484, 490 (1983).

¹⁰⁷ *In re Hier*, 18 Mass. App. Ct. 200, 464 N.E.2d 959 (1984). Although the *Hier* court concluded that *Conroy* and *Barber* were not controlling, it endorsed the reasoning of those cases. In rejecting an argument that "nutrition should be differentiated from treatment and the right of choice confined to the latter," the court stated, "We do not agree that such a distinction should be drawn as a matter of law." 18 Mass. App. Ct. at 207, 464 N.E.2d at 964.

¹⁰⁸ See *Barber v. Superior Court*, 147 Cal. App. 3d 1006, 195 Cal. Rptr. 484 (1983); *In re Colyer*, 99 Wash. 2d 114, 660 P.2d 738 (1983); *supra* notes 75 & 77.

¹⁰⁹ See *In re L.H.R.*, 253 Ga. 439, 445, 321 S.E.2d 716, 722 (1984); *supra* notes 76, 79 & 81. Many persons fear irreversible coma more than any form of disease. See Levy, *supra* note 30, at 1426 ("Many lay persons fear permanent incapacitating neurological disability: 'Whatever you do doctor, don't leave me a vegetable or a permanent burden on my family.'").

¹¹⁰ *Brophy*, slip op. at 41-42.

cision to bar removal of the feeding tube.¹¹¹

In short, despite the *Brophy* court's misplaced emphasis on the supposed difference between artificial life-support systems and artificial feeding and between terminal illness and terminal unconsciousness, the court nearly hit the mark in focusing on human life. In isolating the issue, however, the court asked the wrong question. The question is not whether the state's interest in preserving human life should prevail over the wishes or substituted judgment of a patient in a persistent vegetative state. Instead, the fundamental question is whether a patient who is no longer aware of the environment and is doomed to unconsciousness is a human life.

The issues *Brophy* raised in Massachusetts have also arisen in two cases filed recently in New Jersey. These cases are particularly significant because of the New Jersey Supreme Court's refusal in *In re Conroy* to draw any distinction between the removal of artificial life-support machinery and the removal of artificial feeding.¹¹² The first case, *In re Jobes*, involves a thirty-one year old woman who lapsed into a persistent vegetative state during surgery in 1980.¹¹³ The patient, Nancy Ellen Jobes, receives no life-sustaining treatment other than a tube that supplies food and liquids directly into her small intestine.¹¹⁴ Her husband and parents have filed suit to obtain an order directing the nursing home to remove the feeding tube. The pleadings in *Jobes* assert that "[t]here is no reasonable possibility that [she] will ever return to a 'cognitive sapient state.'" ¹¹⁵

In the second New Jersey action, a guardian for Hilda M. Peter, a sixty-five year old woman who suffered massive brain damage following a heart attack in October 1984, has requested approval for removal of the feeding tube that sustains Peter's existence.¹¹⁶ Neurologists and physicians who have examined Peter conclude that she is in a persistent vegetative state with no chance of recovery and that

¹¹¹ *Id.* at 40.

¹¹² *In re Conroy*, 98 N.J. 321, 369-74, 486 A.2d 1209, 1233-37 (1985).

¹¹³ *In re Jobes*, No. C-4971-85E (N.J. Super. Ct. Ch. Div. filed Oct. 3, 1985). See *Quinlan Lawyer Files Artificial Feeding Suit*, Am. Med. News, Oct. 18, 1985, at 1, col. 4.

¹¹⁴ *Quinlan Lawyer Files Artificial Feeding Suit*, *supra* note 113.

¹¹⁵ *Id.* at 8, col. 2. Trial in the *Jobes* case began on March 24, 1986. See *Family Pressing Bid for Removal of Feeding Tube*, N.Y. Times, Mar. 25, 1986, at 13, col. 1. On April 23, 1986, the trial court judge ruled that the artificial feeding tube could be removed on the ground that there was clear and convincing evidence that Mrs. Jobes had previously expressed the desire not to have her life sustained artificially if she ever became "a helpless, insensate individual." *Jersey Judge Permits Denial of Food to Patient in Coma*, N.Y. Times, Apr. 24, 1986, at 17, col. 5. The court issued a 20-day stay of his ruling to permit opposing attorneys time to prepare an appeal. *Id.*

¹¹⁶ *In re Peter*, No. P-314-85-E (N.J. Super. Ct. Ch. Div. filed Nov. 29, 1985). See *Inquiry Weighs Halting Patient's Tube-Feeding*, N.Y. Times, Nov. 14, 1985, at B2, col. 5.

she would feel no pain if feeding were discontinued.¹¹⁷ Pursuant to New Jersey procedures announced in *Conroy*, Ombudsman Jack R. D'Ambrosio, Jr., announced his decision on March 6, 1986, denying the request to allow removal of the feeding tube from Hilda Peter.¹¹⁸ The Ombudsman's statement is a testimonial to the inadequacy of *Conroy* and existing law in dealing with patients who are in a persistent vegetative state but are not terminally ill. Despite a clear finding that Peter would not have wanted to continue her life in her present state, the ombudsman found that he had to deny the request to remove the feeding tube because Peter did not satisfy the *Conroy* requirement that the patient be likely to die within one year.¹¹⁹ The ombudsman's statement concluded with a call for legislation to allow courts to reach appropriate results in cases like *Peter*.¹²⁰

The cases and statutes permitting private decisions to terminate the life-support systems of patients in a persistent vegetative state, in conjunction with the recent efforts to cease artificial feeding of irreversibly unconscious patients, compel the conclusion that the law now gives de facto recognition to neocortical death. Irreversibly unconscious and noncognitive patients are either dead or alive. If alive, these patients are presently being put to death by relatives, guardians, and courts under the logic of substituted judgment or euthanasia.¹²¹ The final chapter in Karen Ann Quinlan's case viv-

¹¹⁷ *Inquiry Weighs Halting Patient's Tube-Feeding*, *supra* note 116.

¹¹⁸ See Statement of Jack R. D'Ambrosio, Jr., Mar. 6, 1986 (on file at *Cornell Law Review*). See also Sullivan, *Ombudsman Bars Removal of a Feeding-Tube in Jersey*, *N.Y. Times*, Mar. 7, 1986, at 14, col. 1.

¹¹⁹ Statement of Jack R. D'Ambrosio, Jr., *supra* note 118, at 2-3.

¹²⁰

We must come up with answers that make procedures realistic and workable if we are to expect physicians to follow them. We must develop clear standards that serve as guidelines and not obstacles. And we must do so quickly.

Our answers must be flexible enough to meet individual needs and cannot be dogma of any single philosophy.

What do we need now? We need legislation, whether we call it a living will or a medical power of attorney law or any other name. And I believe we need it now, so that we can begin to put these decisions back into the hands of the patient, where they belong. . . .

Our society is growing older. Our medical technology continues to improve. Questions about the quality and dignity of life are being asked more often. No one profession or discipline can provide all the answers. The wisdom and the knowledge of all disciplines must be brought together. There will be more Hilda Peters. Whether their cases will be reported to the Ombudsman's Office as required by law, we cannot be certain. We can be certain that the unanswered issues will not disappear.

Id. at 4.

¹²¹ See Kamisar, *Speaking Out: Karen Quinlan and the "Right-to-Die,"* 29 L. QUADRANGLE NOTES 2 (1985) ("But look again: was it [Quinlan] really a 'right-to-die' case? I think not. I believe it more accurate—albeit much more troublesome—to view it as what might be called a 'power-to-let-some-other-die' case."); Piccione, *No One Has a Right to End a Human Life*, *USA Today*, Mar. 19, 1986, at 8A, col. 5 ("When we deprive a person of

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idly illustrates the point. Quinlan was pronounced dead on June 11, 1985. She did not die of any brain disorder, but from pneumonia which had been diagnosed for months.¹²² The Quinlan family had asked that no extraordinary measures be taken to keep her alive, including the administration of antibiotics or blood pressure drugs.¹²³ The family renewed their request that no revival efforts be undertaken when they were told that death was imminent.¹²⁴ If Karen Ann Quinlan was a living human being prior to June 11, 1985, the family exercised a form of passive euthanasia by allowing her "to die" when and as she did.¹²⁵

The point here is not one of fault but how best to cope with the difficult decisions concerning permanently vegetative patients. Which justification for terminating treatment of the irreversibly unconscious makes more sense: withholding feeding or life-support because the patients are already dead, or terminating therapy to living persons because relatives believe that the patients' lives should end because substitute decisionmakers suspect that the patients would have wanted this result.¹²⁶ Ordinarily, intentionally ending the life of another, whether by act or omission, is homicide. One can finesse the obvious overtones of euthanasia and rationalize the substitute judgment approach by arguing, as courts following *Quinlan* have done, that dispensing death to an incompetent patient is merely affirming the incompetent patient's constitutional or common law right to refuse medical treatment and die. This may be the only acceptable answer to the dilemma of withdrawing treatment or nourishment from living, but terminally ill patients who retain con-

food and water, we are not 'letting him or her die,' as the popular phrase has it. We are knowingly and intentionally causing death by abandonment. This discussion is not a new one, but in earlier years, we were honest enough to call it by its real name: euthanasia, the taking of the innocent life of the ill and infirm.").

¹²² *Karen Ann Quinlan, 31, Dies; Focus of '76 Right to Die Case*, N.Y. Times, June 12, 1985, at A1, col. 2.

¹²³ *Id.*

¹²⁴ *Id.* The same scenario occurred in the *Brophy* case: Mrs. Brophy requested the staff to implement a "non-aggressive treatment plan" which provided that antibiotics were not to be administered in the event of a life-threatening infection. *Brophy v. New England Sinai Hosp. Inc.*, No. 85-E0009-G1, slip. op. at 20 (P. & Fam. Ct. Dep't, Norfolk Div., Dedham, Mass. Oct. 21, 1985), *appeal transferred* to Supreme Judicial Court (No. 86-162, Feb. 14, 1986). The probate court specifically approved this nonaggressive treatment plan. *Id.* at 21.

¹²⁵ See White, *Bioethical Issue Pondered: What Should We Do For Hopeless Patients?*, *Am. Med. News*, Oct. 25, 1985, at 26, col. 1.

¹²⁶ See Kamisar, *The Real Quinlan Issue*, N.Y. Times, June 17, 1985, at A19, col. 1 ("We cannot enter the minds of comatose people to learn if they wish to struggle on. But we can end the fiction of presuming to speak in their behalf. Instead, let courts be honest and say life-support systems should be turned off not because of patient's wishes but, alas, because they think the patient is 'better off dead.'").

sciousness and cognition.¹²⁷

If neocortical death is the death of a human being, however, the substitute judgment test becomes an unnecessary mind trip, a profound leap into the dark work of the permanently insentient. Worse, the current use of the substitute judgment model creates procedural and legal presumptions against withholding or terminating treatment or nourishment. The substitute judgment approach unreasonably burdens families, physicians, and courts with the agonizing decision of whether to "play God" and "let the patient die," even though, rightly viewed, human death has already occurred. Finally, the desire to obtain the legal results of death (insurance benefits, inherited property, favorable date of death tax valuations, or remarriage) may motivate relatives or guardians to terminate a patient's biological existence or deliberate precisely as to when death should be doled out.

A more just and sensible position is to consider irreversibly unconscious noncognitive patients legally dead, but to recognize and account for the possibility of continuing biological existence. When a patient becomes neocortically dead, legal consequences that flow from death, such as criminal liability, should be set in motion. In the example of a robber who shoots a man in the head, suppose that instead of sustaining whole brain death the victim retains brain stem function but falls into a chronic unconscious vegetative state with no hope of regaining cognitive function. Should the robber escape a murder prosecution?¹²⁸ If the victim's spouse is a named beneficiary under a life insurance policy, should the life insurance company be able to deny death benefits?¹²⁹ Should the spouse be barred from remarrying? Should relatives base their decision of when to terminate life-support systems upon tax and estate planning considerations?¹³⁰ Little in logic or social policy supports an affirmative

¹²⁷ A recently completed study of a large renal dialysis center in Minnesota found that 22% of the deaths at the facility between 1966 and 1983 occurred as a result of withdrawal of renal dialysis therapy. Neu & Kjellstrand, *Stopping Long-Term Dialysis, An Empirical Study of Withdrawal of Life-Supporting Treatment*, 314 NEW ENG. J. MED. 14 (1986). The report concluded "that stopping treatment is a common mode of death in patients receiving long-term dialysis, particularly in those who are old and those who have complicating degenerative diseases. Because of the increasing age of patients on dialysis, withdrawal of treatment will probably become more common in the future." *Id.* See also *supra* note 50.

¹²⁸ This example parallels the well publicized trial of Claus von Bülow. Under a neocortical definition of death Mr. von Bülow could have been charged with first degree murder of his wife instead of attempted murder.

¹²⁹ See Thornton, *supra* note 9.

¹³⁰ See Jorrie & Standley, *The Tax Advantages of Lingering Death*, 48 TEX. B.J. 1070 (1985). Jorrie and Standley present "the tax planning opportunities available to the attorney representing a client suffering a prolonged illness inevitably leading to death." *Id.* The authors describe how favorable tax results can be achieved by removing assets

answer to any of these questions. A certificate establishing death for all legal purposes should be issued upon a medical finding of neocortical death.¹³¹

Would this mean that all persons declared legally dead by neocortical standards would have to be buried or cremated?¹³² Would families or guardians be permitted to maintain biological existence if they so desired or if the patient had so specified by a pre-existing death directive or living will? Treating the neocortically dead as legally dead does not and should not require burial or cremation. A patient by prior directive, or the patient's family or guardian by a post-neocortical death decision, should be able to obtain biological maintenance notwithstanding a legal certification of neocortical death. Once the law treats neocortical death as legal death, no public health need or other strong policy reason requires disposal of the body. If the individual or family wishes to maintain biological existence because of religious or other personal beliefs, this wish should be respected. In effect, after a legal and medical determination of neocortical death, the body should be in the hands of the estate's administrator or family to be treated in an appropriate, humane, and ethical manner. Burial, cremation, or biological maintenance are all within the realm of appropriate choices.

The medical profession and legislators would have to decide whether to subsidize biological maintenance of a neocortically dead

from the estate, discounting the value of the remaining estate assets, and delaying or deferring the transfer of taxes. In a section entitled "Using a 'Pull the Plug' Directive for Timing of Death," the authors go so far as to recommend that tax attorneys obtain a durable power of attorney to delay or withhold death directives from attending physicians (assuming the client had the foresight to execute a death directive under a natural death act or living will law) to achieve tax savings by delaying the moment of death:

If the client is not suffering, withholding the directive near year-end and thus delaying the actual moment of death can allow for tax planning to take advantage of the IRC § 2503(b) \$10,000 gift exclusion amount for each donee for another year. In other words, if the client reached this condition near year-end, with creative tax advice and prior planning, the client could, in effect, permit others to select for him the tax year in which he died.

Id. at 1073 (footnote omitted).

¹³¹ Under a neocortical death definition, Karen Ann Quinlan would have been declared legally dead in 1975 instead of 1985. Thousands of other patients who now biologically subsist in a chronic vegetative state with no hope of regaining cognitive function would also be considered legally dead.

¹³² The President's Commission seemed to think so. PRESIDENT'S COMMISSION, *supra* note 4, at 40 ("[T]he implication of the personhood and personal identity arguments is that Karen Quinlan, who retains brain stem function and breathes spontaneously, is just as dead as a corpse in the traditional sense. The Commission rejects this conclusion and the further implication that such patients could be buried or otherwise treated as dead persons."). See also Bernat, Culver & Gert, *On the Definition and Criterion of Death*, *supra* note 5, at 391 ("A practical problem also arises in considering chronically vegetative patients with spontaneous ventilation to be dead. To bury such patients while they breathe and have a heartbeat, most would view as at least aesthetically unacceptable.").

body when the family desires such maintenance but cannot afford it. Although debatable, continuing the existence of a legally dead body should be subject to the financial ability of the estate or relatives to pay for the costs of treatment. Society should not incur the expenses for medical maintenance because society's interest is minimal, given that the body is legally dead.¹³³ The tradeoff is not between dollars and human life but between dollars and biological maintenance.

Absent a directive by the deceased or next of kin for biological maintenance, however, burial or cremation would occur. How would this be done? As Karen Quinlan's case demonstrated, stopping life-support systems may not produce cardiopulmonary death if the patient is capable of spontaneous ventilation. To induce biological death, two procedures seem reasonable: passive termination by withholding nourishment and fluids or active termination by chemical injection. Ending nourishment and hydration produces biological death by slow starvation and dehydration.¹³⁴ Although a neocortically dead patient does not experience the pain of starvation and thirst,¹³⁵ relatives and friends may suffer when witnessing their loved one wither away over a period of weeks. Thus, if a neocortically dead patient biologically exists without the aid of artificial life-support machines, active termination by injection may be a more humane procedure to induce biological death than withdraw-

¹³³ Dr. William Schwartz, a professor of medicine at Tufts University, has stated, "If I know that keeping someone alive for another few months at a cost of \$100,000 will mean that sum is not available for the care of several people with severe hip or heart disease, then I have a new kind of moral dilemma: Is it proper for me to use that limited resource for maintaining life of poor quality for a few months, denying care to others for whom I also have a responsibility?" Schwartz, *U.S. Medicine "Cannot Do Everything for Everybody,"* U.S. NEWS & WORLD REP., June 25, 1984, at 72. A study published by a group of leading neurologists concluded: "Continued support of these 88 patients involved a total of over 500 hospital days, frequently in intensive care units. Not only was this useless terminal care costly (over \$250,000) but the intensive care beds could have been used to treat patients with greater chances of recovery." Levy, *supra* note 30, at 1426. The costs of biologically maintaining a neocortically dead body are substantial. See Goodman, *supra* note 30, at 27, col. 3 ("[Patients in a 'chronic vegetative state'] are in hospital beds at an average cost of \$150,000 per person per year."); Mancusi, *supra* note 87, at 28, col. 6 ("[Mr. Brophy's] care, which costs \$10,500 per month, is being paid for by Blue Cross.").

¹³⁴ In *Brophy v. New England Sinai Hosp., Inc.*, No. 85-E0009-G1, slip op. at 28-29 (P. & Fam. Ct. Dep't, Norfolk Div., Dedham, Mass. Oct. 21, 1985), *appeal transferred* to Supreme Judicial Court (No. 86-162, Feb. 14, 1986), expert physicians testified that withholding food and water from Brophy would produce certain death from starvation, or more probably dehydration, within five days to three weeks. The trial judge noted: "[T]he above-described process [withdrawal of foods and fluids] is extremely painful and uncomfortable for a human being. Brophy's attending physician was unable to imagine a more cruel and violent death than thirsting to death." *Id.* at 29.

¹³⁵ Persons who are neocortically dead cannot experience pain. See *supra* notes 35-38, 87, 97, 117 and accompanying text.

ing fluids and nourishment. As with whole brain dead patients, however, neocortically dead patients should be buried or cremated only upon the cessation of cardiopulmonary functions.

A practical problem may arise if, out of fear of criminal or civil liability or because of personal ethical or religious beliefs, physicians, nursing home employees, or others charged with caring for neocortically dead patients refuse to withdraw feeding tubes or inject chemicals to bring about biological termination. Once neocortical death becomes legally recognized, however, fears of criminal and civil liability for performing appropriate termination procedures pursuant to the wishes of the patient or family become unfounded.

To avoid such concerns, a neocortical death statute should define death, outline termination procedures, and incorporate an immunity principle in clear terms. A model statute might read as follows:

Neocortical Death

- Sec. 1. For the purpose of this statute, "neocortical death" means the irreversible loss of consciousness and cognitive functions. An individual who has sustained neocortical death is legally dead. A determination of neocortical death under this section must be made in accordance with reasonable medical standards and procedures.
- Sec. 2. After a medical determination of neocortical death, the individual may be biologically maintained if the individual has executed a written instrument [in accordance with the jurisdiction's living will statutes or procedures] expressing the desire to be maintained on artificial life-support systems in the event of neocortical death. If the individual has made no such prior written declaration, the family, next of kin, or guardian may provide for biological maintenance.
- Sec. 3. If neither the individual (by a prior written directive) nor the family, next of kin, or guardian elects to provide for biological maintenance, all artificial life-support systems may be withheld and terminated, and the provision of nourishment and fluids may be withheld or ceased. As an alternative to the withholding or cessation of nourishment and fluids as a means of terminating biological existence, the family, next of kin, or guardian may request injection of a chemical in a quantity sufficient to cause biological death. The chemical must be administered in accordance with reasonable medical

procedures.¹³⁶

Sec. 4 No person, firm, or organization shall be subject to criminal responsibility or civil liability for terminating the biological existence of a neocortically dead individual by any of the methods or procedures authorized in Section 3 (withholding or terminating artificial life-support systems, cessation of nourishment and hydration, or lethal chemical injection).¹³⁷

With legal recognition of neocortical death and an express criminal and civil immunity for terminating the biological existence of neocortically dead patients, a medical and ethical consensus may evolve that considers termination of neocortically dead patients' biological functions by cessation of nourishment and fluids or by chemical injections an acceptable and ethical medical practice. Such a consensus is already developing. For example, in July 1985 the Massachusetts Medical Society's governing council endorsed a resolution that recognizes the appropriateness of discontinuing nourishment in the case of vegetative individuals:

"The MMS recognizes the autonomy rights of terminally ill and/or vegetative individuals who have previously expressed their wishes to refuse treatment, including the use of intravenous fluids and gastrointestinal feeding by a tube, and that implementation of these wishes by a physician does not in itself constitute unethical medical behavior provided that appropriate medical and family consultation is obtained."¹³⁸

Similarly, at the national level, at a conference in New Orleans in March 1986, the American Medical Association's Council on Ethical and Judicial Affairs issued a statement that physicians may ethically withhold or withdraw artificial feeding and hydration from terminal or irreversibly comatose patients where adequate procedural safe-

¹³⁶ Cf. TEX. CRIM. PROC. CODE ANN. art. 43.14 (Vernon Supp. 1986) ("Whenever the sentence of death is pronounced against a convict, the sentence shall be executed . . . by intravenous injection of a substance or substances in a lethal quantity sufficient to cause death. . .").

¹³⁷ Cf. *In re Conroy*, 98 N.J. 321, 385, 486 A.2d 1209, 1242 (1985) ("In the absence of bad faith, no participant in the decision-making process [to terminate treatment or nourishment] shall be civilly or criminally liable for actions taken in accordance with the procedures set forth in this opinion.").

¹³⁸ *Brophy v. New England Sinai Hosp., Inc.*, No. 85-E0009-G1, slip op. at 32 (P. & Fam.Ct. Dep't, Norfolk Div., Dedham, Mass. Oct. 21, 1985), *appeal transferred* to Supreme Judicial Court (No. 86-162, Feb. 14, 1986). See *Pact on Right to Die Cited in Court Case*, N.Y. Times, Sept. 6, 1985, at A10, col. 6 ("Charles Amorsino, executive secretary of the Massachusetts Medical Society, testified [in *Brophy*] that his governing council had endorsed a policy recognizing the rights of terminally ill and 'vegetative' patients to reject life-saving treatment."). Similar resolutions have been enacted by the Milwaukee County Medical Society and the Los Angeles Medical Society. *Feeding Withdrawal Gets Conditional Nod*, Am. Med. News, Mar. 28, 1986, at 9, col. 2.

guards are present.¹³⁹

In short, considering that a respectable body of medical opinion already views the termination of feeding of vegetative patients as an acceptable and ethical medical practice, clear legal validation of termination procedures should influence the medical community to generally respect the wishes of the individual patient or family to cease maintaining a legally dead body.¹⁴⁰

¹³⁹ The statement in full reads as follows:

Withholding or Withdrawing Life Prolonging Medical Treatment

The social commitment of the physician is to sustain life and relieve suffering. Where the performance of one duty conflicts with the other, the choice of the patient, or his family or legal representative if the patient is incompetent to act in his own behalf, should prevail. In the absence of the patient's choice or an authorized proxy, the physician must act in the best interest of the patient.

For humane reasons, with informed consent, a physician may do what is medically necessary to alleviate severe pain, or cease or omit treatment to permit a terminally ill patient whose death is imminent to die. However, he should not intentionally cause death. In deciding whether the administration of potentially life-prolonging medical treatment is in the best interest of the patient who is incompetent to act in his own behalf, the physician should determine what the possibility is for extending life under humane and comfortable conditions and what are the prior expressed wishes of the patient and attitudes of the family or those who have responsibility for the custody of the patient.

Even if death is not imminent but a patient's coma is beyond doubt irreversible and there are adequate safeguards to confirm the accuracy of the diagnosis and with the concurrence of those who have responsibility for the care of the patient, it is not unethical to discontinue all means of life prolonging medical treatment.

Life prolonging medical treatment includes medication and artificially or technologically supplied respiration, nutrition or hydration. In treating a terminally ill or irreversibly comatose patient, the physician should determine whether the benefits of treatment outweigh its burdens. At all times, the dignity of the patient should be maintained.

Statement of the Council on Ethical and Judicial Affairs of the American Medical Association, March 15, 1986 (on file at the *Cornell Law Review*). See *Feeding Withdrawal Gets Conditional Nod*, *supra* note 138; *Reassessing Care of Dying, Policy Seen Evolving From A.M.A. Opinion*, N.Y. Times, Mar. 17, 1986, at 1, col. 1.

¹⁴⁰ In the event that a particular physician, hospital, or nursing home steadfastly refuses to cease feeding or to administer a lethal chemical injection to end the biological existence of a neocortically (and, therefore, legally) dead body, a court order to cease feeding would seem appropriate. See *In re Conroy*, 98 N.J. 321, 486 A.2d 1209 (1985) (setting forth procedures for ordering and obtaining removal of feeding tube); *supra* notes 113, 116 (cases seeking court approval to remove feeding tubes). Once the law and a respectable portion of the medical community accept termination under these circumstances, health care providers in charge of neocortically dead patients have a legal, and arguably ethical, duty at least to place the decedent's family or guardian in touch with a physician or hospital willing to perform the procedure. Ordering health care professionals to actively terminate patients by intravenous chemical injection will not be appropriate until a new medical ethic develops in this area. Legal acceptance of such appropriate termination procedures as cessation of feeding or administration of chemical injections would also allow guardians or responsible family members to remove feeding tubes or administer chemical injections in a humane manner. See *Jersey Judge Permits Denial of Food to Patient in Coma*, *supra* note 115 ("The ruling . . . permits Mr.

III DIAGNOSING NEOCORTICAL DEATH

The preceding discussion assumes that neocortical death would be diagnosed in accordance with accepted medical procedures. Arguably, the right to die cases involving irreversibly unconscious patients have established a medical and legal precedent because expert physicians repeatedly have testified with confidence that the patients involved in the particular cases were irreversibly unconscious and insentient.¹⁴¹ In a great number of cases, particularly when vegetative unconsciousness has lasted for more than one month, physicians routinely diagnose irreversibility based upon clinical evaluations and diagnostic procedures such as electroencephalogram (EEG) tests.¹⁴² Nevertheless, critics of a neocortical death definition repeatedly refer to the difficulty of formulating reliable diagnostic criteria for neocortical death.¹⁴³ These critics argue that while physicians in Great Britain contended as early as 1971 that in most cases a flat electroencephalogram and biopsy specimen could confirm neocortical death,¹⁴⁴ these procedures, unlike the well accepted whole brain death criteria,¹⁴⁵ are an imprecise and invasive means of diagnosing irreversible unconsciousness. In 1983, for example, Younger and Bartlett, themselves proponents of a neocortical definition, concluded: "At present, clinicians are unable to apply a definition that identifies death as the absence of consciousness and cognition. Medical science has not yet developed tests that accurately establish the irreversible loss of these functions."¹⁴⁶

Several observations must be made regarding this criticism. First, even if physicians cannot always diagnose neocortical death with certainty, they can diagnose irreversibility with certitude in a significant number of cases. Neurologists are making such diagnoses today and are testifying in court cases involving efforts to terminate life-support machinery and artificial feeding.¹⁴⁷ The American Medical Association's recent policy statement approving withdrawal or withholding of artificial feeding of irreversibly comatose patients

Jobs to take his wife home, 'where the feeding may be removed under the direct supervision of a licensed physician of this state.'").

¹⁴¹ See *supra* notes 74-82 & 87 and text accompanying note 69.

¹⁴² See *supra* notes 74-82 & 87 and text accompanying note 69. See also *supra* note 30.

¹⁴³ See Bernat, Culver & Gert, *On the Definition and Criterion of Death*, *supra* note 58, at 391; Korein, *The Problem of Brain Death: Development and History*, 315 ANNALS OF N.Y. ACAD. OF SCI. 19, 27 (1978); Walton, *Epistemology of Brain Death Determination*, 2 METAMEDICINE 259, 270 (1981); PRESIDENT'S COMMISSION, *supra* note 4, at 40.

¹⁴⁴ Brierly, Adams, Graham & Simpson, *Neocortical Death After Cardiac Arrest*, 2 LANCET 560, 565 (1971).

¹⁴⁵ See *supra* note 5.

¹⁴⁶ Younger & Bartlett, *supra* note 4, at 258.

¹⁴⁷ See *supra* note 141.

also recognizes that accurate diagnosis of irreversible unconsciousness is now possible in many cases.¹⁴⁸ Second, the inevitability of scientific progress suggests that the limits of present medical technologies are no reason to avoid addressing the appropriateness of a neocortical death standard. Third, and most important, science is on the verge of overcoming whatever diagnostic limitations exist. The recent advent of positron emission tomography (PET) scanning now offers the scientific capability of accurately diagnosing metabolic brain function and neocortical death.

PET scanning technology has advanced rapidly in recent years.¹⁴⁹ With a video screen and specific tracers labeled with posi-

¹⁴⁸ See *supra* note 139.

¹⁴⁹ According to Dr. Philip Anderson, Vice-President of the Society of Nuclear Medicine, "Although Positron Emission Computed Tomography, or PET technology, was developed in the 1970s, its refinement is the most important medical and scientific breakthrough being presented at the Society of Nuclear Medicine's 32nd annual meeting [in Houston, Texas, June 1985]." Luna, *Breakthrough Cited for Understanding Treatment of Brain Disorders*, U.P.I. News Release, June 4, 1985 (available on NEXIS, Omni library).

Dr. Henry Wagner, Jr., hailed the dramatic development of PET scanning technology in an editorial in the *New England Journal of Medicine*.

Today we are witnessing the birth of a new technique for the study of the human brain, based on the use of radioactive tracer molecules labeled with carbon-11, fluorine-18, and oxygen-15. . . . After injection, the bi-distribution of the tracers is portrayed by positron-emission tomography (PET). In a typical study, the cyclotron-produced radioactive atom is incorporated into a substrate, such as glucose or fatty acid, or into a drug The intravenously injected glucose or oxygen is metabolized in bioenergetic pathways Serial images of regions within the brain are produced by the measurement of gamma rays coming from within different regions of the brain. . . . A PET scanner is similar to a computed tomography (CT) scanner except that gamma rays are emitted from within the patient instead of traveling across the brain as in x-ray CT.

As a result of work performed in several countries throughout the world beginning in the mid-1970s, it is now well established that measurable increases in regional blood flow and in glucose and oxygen metabolism accompany mental functions, including perception, cognition and emotion

The ability to study neurotransmitters and neuroreceptors as well as the substrate metabolism of the brain makes it increasingly likely that every major university medical center will have a cyclotron and positron tomographic device within the next 5 to 10 years

It is predictable that regional cyclotrons, whether operating at university medical centers or commercially developed, will soon provide short-lived tracers labeled with carbon-11 or fluorine-18 to community hospitals throughout a city Another developing clinical application is the measurement of regional oxygen metabolism as an indicator of the survivability of involved regions of the brain in patients with strokes

. . . Perhaps it is not overstating the case to say that in positron-emitting tracers in community hospitals and PET in major medical centers, we now have a new set of eyes that permit us to begin to examine the chemistry of the mind.

Wagner, *Probing the Chemistry of the Mind*, 312 *NEW ENG. J. MED.* 44, 45-46 (1985). See also

tron-emitting isotopes, scientists can now measure the brain's intricate chemistry *in vivo* by viewing blood flow or uptake of glucose and oxygen in selected subregions of the brain and thereby assess higher brain functions.¹⁵⁰ PET scanning studies correlating human brain disorders (Alzheimer's disease,¹⁵¹ Huntington's disease,¹⁵²

PET Scans Relate Clinical Picture to More Specific Nerve Function, 253 J. A.M.A. 943 (1985) [hereinafter cited as *PET Scans*].

¹⁵⁰ See Cherry & Cherry, *Another Way of Looking at The Brain*, N.Y. Times, June 9, 1985, (Magazine), at 56, col. 1.

Where CAT and M.R.I. excel at revealing details of the brain's anatomy, Positron Emission Tomography (PET) shows the brain actually at work, going about its minute-by-minute metabolic business. "CAT and M.R.I. are like road maps, PET shows the traffic moving on the roads," explains Dr. Thomas N. Chase, chief of experimental therapeutics at the National Institute of Neurological and Communicative Disorders and Stroke, in Bethesda, Md. . . .

. . . .
 Before a scan, the patient is injected with a form of sugar that has been radioactively tagged to enable scientists to watch it as it proceeds along its chemical path. The sugar quickly passes to the always-hungry brain cells, where the glucose is rapidly absorbed—quite literally becoming food for thought. As it is digested, the substance emits particles called positrons, which collide with electrons to produce gamma rays. Computers then add all the information together, producing a picture of something never before seen so accurately: the brain at work. Suddenly an act of intention can be caught *in flagrante*, captured in the easy-to-identify gaudy blues and psychedelic yellows often used in PET scans. If you listen to a snatch of music uncritically, PET will show, by color, one part of your brain activating; if you analyze the sound, other parts of the brain will function, producing a different image. Decide to raise your hand, and your decision will appear on the scan in different colors and in different areas as your brain makes ready to obey your wish.

Id. at 110-11.

PET "traces biological molecules in the body," says Dr. Steve M. Larson, chief of the department of nuclear medicine at NIH's Clinical Center, where the installation of a new PET system is nearly completed. "The basic importance is that we can measure the body's metabolism" for the first time.

Instead of seeing an anatomical image of the inside of the brain, the PET measures its activity. PET is being studied as a way of diagnosing epilepsy, stroke and Parkinson's disease, tracking blood flow in the body and following the progress of tumors.

Thompson, *The Body Transparent: High Tech Devices Let Doctor See the View From Within*, Washington Post, Oct. 23, 1985, Health at 14, col. 2. See also *infra* note 161.

¹⁵¹ See Cutler, Haxby, Durara, Grady, Kay, Kessler, Sundaram & Rapoport, *Clinical History, Brain Metabolism, and Neuropsychological Function in Alzheimer's Disease*, 18 ANNALS OF NEUROLOGY 298 (1985); Foster, Chase, Fedio, Patronas, Brooks & Di Chiro, *Alzheimer's Disease: Focal Cortical Changes Shown by Positron Emission Tomography*, 33 NEUROLOGY 961 (1985).

¹⁵² See Wong, *PET Imaging of Dopamine and Serotonin Receptors in Huntington's Chorea* (paper presented at the International Symposium on Clinical Applications of Radionuclide Studies of the Brain, Washington, D.C., 1984); Whitehouse, Trifiletti, Jones, Folstein, Price, Snyder & Kuhar, *Neurotransmitter Receptor Alterations in Huntington's Disease: Autoradiographic and Homogenate Studies with Special Reference to Benzodiazepine Receptor Complexes*, 18 ANNALS OF NEUROLOGY 202, 209 (1985).

brain tumors,¹⁵³ dementia,¹⁵⁴ cerebral infarction,¹⁵⁵ stroke,¹⁵⁶ and Parkinson's disease¹⁵⁷) with reduced levels of glucose and oxygen utilization and blood flow have already yielded significant findings.

According to leading neurologists and radiologists, PET scanning may soon yield a reliable operative test for diagnosing irreversible loss of consciousness.¹⁵⁸ Neurological studies currently

¹⁵³ Jarden, Dhawan, Poltorak, Posner & Rottenberg, *Positron Emission Tomographic Measurement of Blood-to-Brain and Blood-to-Tumor Transport of ⁸²Rb: The Effect of Dexamethasone and Whole-Brain Radiation Therapy*, 18 ANNALS OF NEUROLOGY 636 (1985).

¹⁵⁴ See Mesulam, *Dementia: Its Definition, Differential Diagnosis, and Subtypes*, 252 J. A.M.A. 2559, 2560 (1985).

¹⁵⁵ See Wise, Rhodes, Gibbs, Hatazawa, Palmer, Frackowiak & Jones, *Disturbance of Oxidative Metabolism of Glucose in Recent Human Cerebral Infarcts*, 14 ANNALS OF NEUROLOGY 627 (1983).

¹⁵⁶ See Kuhl, Phelps, Kowell, Metter, Selin & Winter, *Effects of Stroke on Local Cerebral Metabolism and Perfusion: Mapping by Emission Computed Tomography of FDG and NIH*, 8 ANNALS OF NEUROLOGY 47 (1980).

¹⁵⁷ See Thompson, *Designer Drug [MPTP] Linked to Parkinson's*, Washington Post, June 12, 1985, Health at 9, col. 1: "[PET] scans show that dopamine distribution is equally reduced in the brains of both drug addicts and older Parkinson's patients."

¹⁵⁸ Dr. John C. Mazziota, Associate Professor of Neurological and Radiological Sciences at the U.C.L.A. School of Medicine, a principal investigator in the U.C.L.A. PET scanning laboratory and Chief of the Neurological section, states that PET scanning offers a very reasonable potential for success in formulating reliable criteria for assessing irreversible loss of consciousness. Mazziota believes a study involving PET scanning of patients in the persistent vegetative state would lead to formulation of diagnostic guidelines. He states that such a study is currently being done at the Cornell University Medical College. Telephone interview with John C. Mazziota, M.D. (Dec. 13, 1985) (notes of interview on file with author).

Dr. David E. Levy, Associate Professor of Neurology at Cornell University Medical College in New York City, together with Dr. Fred Plum, Professor of Medicine and Chairman of the Department of Neurology at Cornell University Medical School, currently are directing the Cornell PET scan study of vegetative patients. Although their findings are not yet published, two abstracts from the study have been submitted to the American Academy of Neurology for its meeting in St. Louis in March 1986. The abstracts (one study of three vegetative patients and one locked-in patient and a second study of one locked-in patient) are authored by Levy, Rottenberg, Jarden, Sidtis, Strother, Thaler, Dhawan and Plum. The abstracts are titled: "PET Studies of Regional r CMRG lu [research cerebral metabolism for glucose levels] in Vegetative and Locked-in Patients."

The Cornell study details several significant findings. First, vegetative patients who have suffered cerebral hypoxia-ischemia (e.g., cardiac arrest) show markedly decreased levels of glucose utilization and blood flow. Dr. Levy states that the levels are profoundly depressed, indicating a severe loss of neocortical functions. Second, Dr. Levy notes that PET scans have revealed that patients in a "locked-in syndrome" (see *supra* note 6), as opposed to patients in a persistent vegetative state, show normal levels of glucose utilization and blood flow. Thus, Dr. Levy concludes that PET scanning can now determine whether a patient is locked-in. Dr. Levy believes that PET scanning combined with traditional methods of clinical evaluation of vegetative patients will enable doctors reliably to diagnose the irreversibility of the persistent vegetative state. Telephone interview with David E. Levy, M.D. (Dec. 16, 1985) (notes of interview on file with author).

Dr. Henry H. Wagner, Jr., Professor of Medicine, Radiology and Environmental Health Services at The Johns Hopkins Medical Institution and Director of the Division of Nuclear Medicine and Radiological Health Services, believes that the use of PET scan-

underway at Cornell University Medical College in New York City use PET scanning techniques to confirm that vegetative patients who have been without consciousness for lengthy periods have significantly depressed levels of glucose utilization and blood flow.¹⁵⁹ As more PET scans are performed on neocortically dead patients, medical scientists will be able to formulate threshold levels of bioenergetic chemical utilization below which persons never regain consciousness.¹⁶⁰ In short, with the breakthrough in PET scanning, the argument that neocortical death is incapable of being reliably diagnosed is no longer tenable.

PET scanning technology is expensive. Although PET scanners cost approximately \$1.5 million,¹⁶¹ twenty-six medical centers in the United States now perform PET scans,¹⁶² and plans for PET scanning operations are underway throughout the country.¹⁶³ As usage

ning to diagnose irreversible loss of consciousness will be proven successful in clinical studies. Dr. Wagner concludes that PET scan analysis of the electrical and chemical metabolism of the brain will establish discrete chemical levels that correlate with irreversibility. Telephone interview with Henry N. Wagner, Jr. (Dec. 23, 1985) (interview notes on file with author).

Dr. Gerald M. Fenichel, Professor of Medicine and Chairman of the Neurology Department at Vanderbilt University Medical School, also believes that PET scanning will facilitate development of an operative diagnostic test for determining irreversible loss of consciousness. Interview with Gerald M. Fenichel, M.D. (Dec. 13, 1985) (notes of interview on file with author).

¹⁵⁹ See *supra* note 158.

¹⁶⁰ See *supra* note 158.

¹⁶¹ See *Radiology: Newest Diagnostic Probes: Super Snapshots Inside the Body Pinpoint Trouble Spots*, U.S. NEWS & WORLD REP., Nov. 11, 1985, at 58:

One of the first of a new wave of imaging techniques that can measure metabolism and show response to drugs is a 1.5 million-dollar device called PET. Shaped like a giant tire, the Positron Emission Tomography device is used to map the brain by measuring the way cells use glucose, their main fuel. Scans show different brain patterns when a person is thinking, resting, listening to music or remembering.

PET can show differences between the brains of healthy people and those with symptoms of Alzheimer's disease.

It is proving to be the best tool in locating damaged tissue in the brain

See also Raeburn, *New Scanner is First to Diagnose Alzheimer's, Other Brain Disorders*, A.P. News Release, May 28, 1985 ("The cost of a completely equipped PET center is expected to be about \$2 million," stated Dr. Michael Phelps of the University of California at Los Angeles.); *Hospitals, Doctors Must Join Forces to Buy Costly Equipment*, Washington Post, Oct. 23, 1985, Health at 15, col. 1.

¹⁶² *The Brain Yields Its Secrets to Research*, U.S. NEWS & WORLD REP., June 3, 1985, at 64. See Cherry & Cherry, *supra* note 150, at 116 ("in Japan, always a bellwether country in technology, there are eight PET scanners in operation, and experts believe most Japanese medical schools will soon be outfitted with PET units").

¹⁶³ See *The Brain Yields Its Secrets to Research*, *supra* note 162 ("PET is expected to be ready for routine use within five years."); *Hospitals, Doctors Must Join Forces to Buy Costly Equipment*, *supra* note 161 ("I personally believe . . . that major hospitals and university hospitals will have PET," says Dr. Steven M. Larson, chief of nuclear medicine at NIH's Clinical Center."); *Methodist Hospital Shows Off New Scanner*, A.P. News Release, July 30, 1985 ("Eventually, [Dr. Eugene D. Van Hove, Director of Radiology at Methodist

of PET scanning expands, the costs of purchasing PET systems are expected to decline.¹⁶⁴ Considering the wide array of clinical applications for PET scanning and the positive results PET has yielded thus far,¹⁶⁵ experts predict that PET scanning will be widespread in the United States within five years.¹⁶⁶ Even at current costs of approximately \$1,000 per scan,¹⁶⁷ PET scanning is cost-effective as a diagnostic test for neocortical death when compared with costs of \$10,000 or more per month to biologically maintain a neocortically dead patient.¹⁶⁸

IV

MEDICO-LEGAL IMPLICATIONS OF NEOCORTICAL DEATH

Legal recognition of neocortical death raises numerous issues, the most intricate of which concerns organ transplants. Although whole brain dead patients may be biologically maintained for only a few hours or days, patients declared dead under a neocortical definition could be biologically maintained for years.¹⁶⁹ Therefore, a ne-

Hospital, Indianapolis, Indiana said,] Methodist hopes to have positron emission tomography (PET) scans to look at brain metabolism.”); *Case Western Medical School to Get PET Scanner*, A.P. News Release, July 17, 1985 (“Medical researchers at Case Western Reserve University School of Medicine may soon have a positron emission [sic] tomography (PET) scanner The PET scanner, which will be housed at University Hospitals in Cleveland, will be the first in Ohio.”); Wagner, *Probing the Chemistry of the Mind*, 312 *NEW ENG. J. MED.* 44, 45-46 (1985) (“[I]t [is] increasingly likely that every major university medical center will have a cyclotron and positron tomographic device within the next 5 to 10 years.”).

¹⁶⁴ See Cherry & Cherry, *supra* note 150, at 120; Wagner, *supra* note 163.

¹⁶⁵ See *supra* notes 149, 150, 151-58 and accompanying text.

¹⁶⁶ See *supra* note 163.

¹⁶⁷ According to Dr. Joseph P. Whalen, Chairman of the department of radiology of New York Hospital, the approximate cost to patients for a PET scan is at least \$1,000. Cherry & Cherry, *supra* note 150, at 120. See also *New Scanner is First to Diagnose Alzheimer's, Other Brain Disorders*, *supra* note 161 (predicting PET scan costs will soon be \$500 to \$700 per scan).

¹⁶⁸ See *supra* notes 30 & 133.

¹⁶⁹ See *supra* note 31. Successful transplants require viable, intact organs. Unlike whole brain dead donors, neocortically dead donors would not be subject to the precarious time clock of a few scant hours or days in which to transplant a kidney, heart, or lung, for example.

In recognition of the need to improve the system of organ transplantation, the Secretary of Health and Human Services appointed a panel to improve the nation's organ transplant network pursuant to congressional legislation calling for study and funding of donor transplant programs. See *Panel on Transplants Named*, *N.Y. Times*, Jan. 27, 1985, at A16, col. 1. See also *Sales of Kidneys Increasing As Transplants Proliferate*, *Am. Med. News*, Nov. 15, 1985, at 18, col. 3 (“The demand for kidneys for transplantation has become so great that the organs are being sold for up to \$13,000.”). This task force has considered several recommendations to advance organ transplantation, including: requiring hospital staff to ask families of patients who have just died about organ transplantation; encouraging cooperation from coroners and medical examiners; accrediting organ-procurement agencies; and requiring high school courses to treat the subject of donation. See *Legislation to Spur Organ Donations Urged*, *Am. Med. News*, Oct. 18, 1985, at 24,

ocortical death standard could significantly increase the availability of viable transplant organs. This raises the possibility that neocortically dead bodies, or parts thereof, could be donated and maintained for long term research, for organ banks, or for other purposes such as drug testing or manufacturing biochemical compounds.¹⁷⁰

The transplant issues in cases involving neocortical death under the legal death/biological death differentiation advanced in this Article arise only when the patient or patient's family elect not to preserve biological existence because transplantation or other use of a neocortically dead body is inconsistent with a desire to preserve biological existence. If the family decides not to maintain biological existence but to donate the body to science, could scientists or physicians biologically maintain the body for transplant or research purposes?

One approach to the problems raised by the potential for keeping a donated neocortically dead body biologically alive for scientific purposes is simply to maintain the legal status quo. No qualitative difference exists between the types of procedures, transplants, or research currently allowed on bodies that have been declared dead under whole brain standards but that still maintain cardiopulmonary functions, and the type of research, transplants, and experiments that would be undertaken on bodies that have been declared dead under neocortical criteria but that continue to exhibit cardiopulmonary activity.¹⁷¹ Consequently, the decedent or relatives could donate the neocortically dead but biologically alive body or body parts by the procedures and for the purposes set out in the Uniform Anatomical Gift Act.¹⁷² Long-term research or transplant operations would depend on medical ethics. A neocortical standard merely extends the time window for action.

A second approach is to recognize the temporal differences be-

col. i; *N.Y. Hospitals Required to Ask About Organ Donation*, Am. Med. News, Sept. 27, 1985, at 21, col. 1 (discussing New York law, effective January 1, 1986, which requires hospitals to ask families for organ donations whenever a patient dies). See also *New Worry About Donor Heart Supply*, Am. Med. News, Sept. 13, 1985, at 2, col. 4.

¹⁷⁰ See Arnold, *Neomorts*, 54 U. TORONTO MED. J.35, 37 (1977).

¹⁷¹ In a highly publicized case, 26-year-old Pelle Lindbergh, an all-star goalie for the Philadelphia Flyers hockey team, was pronounced brain dead under whole brain death criteria in a New Jersey hospital after suffering massive injuries to his brain and spinal cord in an automobile accident. Lindbergh, pursuant to his family's wishes, was biologically maintained on a respirator until his heart, liver, kidneys, pancreas, eyes, and portions of his skin were removed for transplantation. *Redefining Death: Technology and Transplants Complicate Life's Final Certainty*, Washington Post, Nov. 20, 1985, Health at 7, col. 1.

¹⁷² UNIF. ANATOMICAL GIFT ACT §§ 3-4, 8A U.L.A. 41 (1983). These purposes include medical or dental education, research, advancement of medical or dental science, therapy, or transplantation. *Id.*

tween neocortical and whole brain death and to make appropriate law reforms. For example, under a neocortical definition it would be possible not only to remove the eyes or a kidney from a body that breathes and has a heartbeat, but also to continue maintaining the body for years for other transplants or research. This new possibility may create a need for revising the Uniform Anatomical Gift Act's transplant procedures. Under current law families or persons who sign donor cards might not be aware that the corpse could be used for human experimentation or long term scientific research. Therefore, in cases involving neocortical death in which the body or parts thereof were intended for long term research, transplants, or experiments that would not have been possible under whole brain standards, one possible solution is to forbid third-party donations and require a written donation document signed by the donating decedent that donates the entire body or relevant organs. Or, more narrowly, the law could require a donation consent form that specifically included the chronic persistent vegetative state-neocortical death circumstance. An intermediate position would permit a family or guardian to make donations for long term maintenance for transplant or other scientific purposes if the family or guardian were fully informed of the intended use of the deceased's body or organs.

These approaches assume the ethical propriety, in at least some circumstances, of biologically maintaining a neocortically dead body for medical or scientific purposes.¹⁷³ This ethical issue need not be finally resolved in order to justify acceptance of a neocortical definition; if society is not yet ready to seek and accept donations of neocortically dead bodies for long term biological maintenance for transplantation or experimentation purposes, we may avoid the problem simply by treating neocortically dead bodies as we now treat whole brain donations. Under this approach, biological existence would be maintained only for limited transplant purposes with the view toward terminating cardiopulmonary functions following the transplant procedure.

Giving legal effect to neocortical death does not present any special legal problems that cannot be resolved with just results. Under present tort law, a tortfeasor who causes a person to lapse into an irreversibly noncognitive condition is subject to liability for personal injuries.¹⁷⁴ Declaring the victim legally dead in this situation would require no real change in the tort law. The tortfeasor

¹⁷³ Some commentators question the ethics of such a practice. See H. Jonas, *Against the Stream: Comments in the Definition and Redefinition of Death*, in *PHILOSOPHICAL ESSAYS*, 37 & n.91 (H. Jonas ed. 1974); D. WALTON, *BRAIN DEATH, ETHICAL CONSIDERATIONS* 45, 76 (1980).

¹⁷⁴ See, e.g., *Hathaway v. Frank*, 28 ATLA L. REP. 133 (Maricopa County Sup. Ct., Ariz. No. C 503370, Dec. 31, 1984) (\$5 million jury verdict for 33-year-old stockbroker

would be subject to liability for wrongful death under survival and wrongful death statutes. A court might have to decide the measure or extent of damages if the patient or family decided to maintain the neocortically dead body's biological existence. The defendant might contend that the costs of maintaining the neocortically dead body are avoidable damages because the law would permit termination of treatment. Courts should reject this mitigation of damages theory on the basis of existing tort law. If a patient or family desires maintenance, requiring the tortfeasor to bear this expense is consistent with both the result under the status quo and the principle that the tortfeasor takes his victim as he finds him.¹⁷⁵

A potential scenario in the criminal law context involves the person who intentionally and wrongfully induces cardiopulmonary death of a neocortically dead patient who is being biologically sustained pursuant to the wishes of the family or the prior directive of the decedent. Because the body was already legally dead, the wrongdoer would not be guilty of manslaughter.¹⁷⁶ The actor should be liable in tort, however, for the intentional infliction of emotional distress to surviving family members. Legislation to impose criminal sanctions for such conduct may also be appropriate.¹⁷⁷

who became permanently comatose following improper administration of anesthesia during surgery).

¹⁷⁵ See W. PROSSER & W. KEETON, *PROSSER AND KEETON ON TORTS* 292, 458 (5th ed. 1984) (discussing liability for unforeseeable consequences and unreasonable failure to mitigate damages).

¹⁷⁶ An attempted murder charge might be sought if the defendant believed the body were alive at the time the defendant acted. See *United States v. Thomas*, 13 U.S.C.M.A. 278, 32 C.M.R. 278 (1962). But see W. LAFAVE & A. SCOTT, *CRIMINAL LAW* 443-44 (1972) (criticisms of result in *Thomas*).

¹⁷⁷ For example, in an Illinois case, a father who slammed a severely deformed infant onto the delivery room floor 29 minutes after birth was charged with murder. See *Mistrial in Killing of Malformed Baby Leaves Town Uncertain About Law*, N.Y. Times, Feb. 15, 1985, at 9, col. 1. If the child was born with severe brain damage to the point of being irreversibly unconscious and noncognitive (a fact not capable of proof given the short time period before the infant was killed), under a neocortical death definition the father may have committed no crime because the infant was born legally dead although biologically alive. Under either a neocortical definition of death or under the right of privacy/right to die cases, the parents had the option of terminating biologic existence. See, e.g., *In re L.H.R.*, 253 Ga. 439, 321 S.E.2d 716 (1984) (approving termination of life-support systems for infant born irreversibly noncognitive and unconscious). Unlike disconnecting life-support machines or nourishment systems and unlike active termination by chemical injection, however, the father's acts in this case may well call for criminal sanctions, even if the infant's parents would have sought withdrawal of treatment and cessation of food and water. For example, his conduct may be considered an "abuse of corpse." TEX. PENAL CODE ANN. § 42.10(a)(1) (Vernon 1974) ("A person commits an offense if, not authorized by law, he intentionally or knowingly . . . treats in a seriously offensive manner a human corpse.").

A recent Florida case further illustrates how a neocortical definition of death would avert the current application of homicide laws to cases that involve terminating the bio-

A neocortical definition of legal death would also affect insurance law. At present, irreversibly unconscious noncognitive patients continue to receive health insurance and disability benefits¹⁷⁸ but do not receive death benefits under life or accidental death insurance policies.¹⁷⁹ Under a new legal definition of death that incorporated neocortical death, the opposite results would occur because the insured would be legally dead. Beneficiaries would receive life and accidental death benefits, but insurance companies would not be obliged to pay health or disability benefits under current policies. If the law recognized neocortical death but reserved the right to keep the body biologically alive, insurance companies would be likely to rewrite or offer new health insurance policies providing coverage for the costs of post-neocortical death biological maintenance.

A potential conflict may arise between the wishes of the decedent's heirs or devisees and the decedent's documented desire to be maintained biologically. Suppose that while competent the decedent wrote a "living will" expressing his desire to be kept on life-support systems in the event of an irreversible loss of cognitive functions. The decedent's heirs or beneficiaries might contend, however, that maintaining a dead body constitutes a "waste" of the estate's assets. In this situation, the decedent's directive should control. Although under present law deceased persons' directives concerning disposition of their bodies are treated only with "benevolent discretion" by courts,¹⁸⁰ a directive to maintain biological life is materially different from a request to be buried with "all my diamonds, stock and sterling silver."¹⁸¹ In sum, the legal nuances that may arise if the law sanctions neocortical death do not appear to be serious or incapable of fair resolution.

CONCLUSION

The current legal treatment of brain death is both anomalous

logical existence of a neocortically dead body. A 25-year-old father had shot and killed his three-year-old daughter who, as a result of a freakish accident involving a reclining chair, was irreversibly unconscious and noncognitive. The father received a mandatory 25-year sentence. See *Comatose Toddler Shot to Death; Heartsick Father Turns Himself In*, N.Y. Times, June 30, 1985, at 18, col. 5.

¹⁷⁸ See *In re Barry*, 445 So. 2d 365, 368 (Fla. Dist. Ct. App. 1984) (health insurance); *Mack v. City of Minneapolis*, 333 N.W.2d 744, 746 (Minn. 1983) (disability benefits). See also *supra* note 95.

¹⁷⁹ *Douglas v. Southwestern Life Ins. Co.*, 374 S.W.2d 788, 791 (Tex. Civ. App. 1964) (life insurance-accidental death benefits).

¹⁸⁰ J. DUKEMINIER & S. JOHANSON, *FAMILY WEALTH TRANSACTIONS, WILLS, TRUSTS AND ESTATES* 409 (1978).

¹⁸¹ See *Merkus Estate*, 24 Pa. Fiduc. 249 (Orphans' Ct. 1974) (such bequest held against public policy).

and unsound. Present law is grossly inconsistent: it upholds surrogate decisions to terminate life-support systems and nourishment when incompetent patients irreversibly lose all consciousness and cognitive functions, yet it fails to recognize neocortical death. If society accepts sentencing death to the irreversibly noncognitive—and there is a growing medical, legal, and public consensus to do so—then it is logical, just, and humane to treat the irreversible loss of higher brain functions as legal death, reserving the right of the patient or the patient's family to maintain biological existence. Including neocortical death within the law's definition of death ensures that the consequences and rights flowing from whole brain and cardiopulmonary death will also attend neocortical death.

Distinguishing legal from biological death profoundly alters the moral and legal dilemmas in "tragic choice" cases. When physicians determine that a person has irreversibly lost all those cerebral qualities that distinguish human life, artificial life-support systems and nourishment may be terminated because the patient is legally dead. Relatives, guardians, and physicians will not be forced to obtain judicial approval to terminate nourishment or cardiorespiratory support regimens. Families will not be compelled to end the biological existence of a family member in order to achieve the financial and legal results that follow a determination of death. In neocortical brain death cases guardians, families, and courts would no longer be required to engage in a will-o'-the-wisp endeavor to discover what unconscious patients thought about death or would have thought about death even if they had never thought about it or had been incapable of thinking at all. No longer will the law favor artificially maintaining someone in an inhuman state. T. S. Eliot captured the essential point in the epigraph from Petronius's *Satyricon* which appears at the beginning of *The Wasteland*. After granting the Sibyl of Cumae the gift of eternal life, Apollo does not grant her eternal youth, and consequently her body shrivels up until she lives in a bottle:

For I saw with my own eyes the Sibyl hanging in a jar at Cumae,
and when the acolytes said, "Sibyl what do you wish?" she replied,
"I wish to die."¹⁸²

¹⁸² T.S. Eliot, *The Wasteland*, in THE NORTON ANTHOLOGY OF MODERN POETRY 459 (R. Ellman & R. O'Clair eds. 1973).