



## MEDICINE

### *Defining Death*

The article “The Circulatory-Respiratory Determination of Death in Organ Donation,” which appeared in the March issue of *Critical Care Medicine*, adds a cogent analysis to the discussion on death determination in the context of organ donation. This document is the work of a multidisciplinary panel funded by the Health Resources and Services Administration, an agency of the Department of Health and Human Services. Although the panel was not charged with providing consensus recommendations to the HRSA, its report will undoubtedly shape and solidify certain practices in vital organ donation.

After succinctly tracing the developments of death determination and noting the increasing practice of donation after the circulatory determination of death (DCDD), the panel delves into the medical and technical issues involved in this practice. One of the key issues concerns the “dead-donor rule” derived from the Uniform Anatomical Gift Act; the rule states, in effect, that donors of vital organs must be declared dead before organ removal occurs. Crucial to this rule is the amount of time between asystole (when the heart stops beating and circulation stops) and the declaration of death. The panel notes that there is no well-established consensus about when death should be declared, although the general guideline is cessation of circulation and respiration for two to five minutes. Further, the definition of death has included the term “irreversible,” often used interchangeably with the term “permanent,” when referring to cessation of circulatory and respiratory functions. The panel states that these terms are not exactly the same. *Irreversible* cessation of function means that the function *cannot* be restored, whereas *permanent* cessation of function implies that function *will not* be restored. This is an important distinction, since the function of a donor’s heart is, in fact, expected to be restored in the recipient.

The panel also considers other relevant issues, such as the postmortem use of extracorporeal membrane oxygenation (ECMO) to support donated organs and the implications of the use of ECMO to maintain circulation in a “dead” person for the

purpose of organ preservation. The panel discusses whether the use of ECMO retroactively negates a death declaration since circulation is restored and maintained and an irreversible situation of brain death does not occur in the “dead” person. Overall, this is an important article for those interested in medical ethics and the technical aspects of organ donation.

In a supplement to the September issue of *Critical Care Medicine*, Drs. - Michael Souter and Gail Van Norman highlight ethical controversies surrounding the definition of death. Interestingly, for a reality that might seem incontrovertible, for instance, whether a person is either dead or alive, interlocutors readily appreciate the ethical quandaries present in determinations of death, especially in the context of vital organ donation. Like the expert panel in the first article discussed above, Souter and Van Norman nicely review the matter of defining death and take issue with the notion that “irreversible” is ethically equivalent to “will not be reversed.” Appealing to deontological reasoning about the morality of an action, they note that the intention of the moral agent is important and that basing a definition of death on the intention not to reverse a potentially reversible condition is not the same as asserting that a process is irreversible. They caution that a prediction of death should not be confused with a diagnosis of death. Souter and Van Norman point out the need for additional work to determine when circulatory arrest becomes irreversible and when total cessation of brain function occurs. Otherwise, they suggest the dead-donor rule should be abandoned as a prerequisite for the removal of vital organs.

Defining death in the context of vital organ transplantation is also discussed in the July issue of *Chest*. Dr. James Bernat’s article “Are Donors after Circulatory Death Really Dead, and Does It Matter? Yes and Yes” is in point-counterpoint format. Bernat argues for declaring death on the basis of permanent cessation of circulation. Although the word “irreversible” is used in the definition of death by circulatory criteria, an apparent sleight of hand with the words “irreversible” and “permanent” seems to be part of the general argument for DCDD. Bernat, who was also the primary author of the above expert panel report, reiterates the distinction between “irreversible” and “permanent” and believes that it is important to maintain the dead-donor rule.

In response to Bernat’s article, Dr. Robert Truog, one of the first to suggest a suspension of the dead-donor rule, and Dr. Franklin Miller argue that donors after circulatory determination of death are not “really dead” and that even if they were dead, it would not really matter (“Are Donors after Circulatory Death Really Dead, and Does It Matter? No and Not Really”). Truog and Miller disagree with Bernat on deontological grounds. They illustrate the difference between dying (when there is no intention to resuscitate if circulatory arrest occurs) and death (when irreversible circulatory arrest occurs). Further, they suggest that in cases of DCDD, the dead-donor rule is untenable and can be violated. In a rebuttal, Bernat emphasizes that DCDD is a matter of medical practice and not ontology. I agree with Truog and Miller that in DCDD the patient is not dead; unlike them, however, I think it does not matter. It does matter that the cause of death is the removal of vital organs from a dying person.

Currently, this controversy in organ donation seems to end with pronouncements like these. It needs to continue, exploring what it means to die, not just how

death is defined. Furthermore, it needs to carefully address the matter of moral agents acting to bring about a person's death as a foreseen but unintended consequence of a particular action. An appeal to the principle of double effect may inform this controversy; however, the principle is only useful if death is an unintended side effect.

### *Assisted Reproductive Technology*

When practiced for nonmedical reasons, sex selection—the attempt to control the sex of one's offspring—is highly controversial; when performed for medical reasons, however, it is generally accepted. A common medical reason for sex selection is to avoid having a child with a severe genetic disorder. In fact, preimplantation genetic diagnosis was first used to select for female embryos in cases where parents were at high-risk of passing on an X-linked disorder, like hemophilia or Duchenne muscular dystrophy, to a son. In their article, “Avoiding Transgenerational Risks of Mitochondrial DNA Disorders: A Morally Acceptable Reason for Sex Selection?” Annelien Bredenoord and colleagues discuss the use of sex selection not to avoid a genetic disorder in the child but rather to avoid possible health risks in future generations (*Human Reproduction*, June 2010). This article specifically addresses how mitochondrial DNA (mDNA) disorders could be avoided by the use of sex selection as part of preimplantation genetic diagnosis and, possibly in the future, as a part of nuclear transfer procedures. Since mDNA is inherited from the mother, “discarding” female offspring theoretically reduces the risk of mDNA disorders. The authors discuss how sex selection for mDNA disorders can be accomplished before or after conception, oddly enough suggesting that sex selection before conception may “have the important benefit of not involving the discarding of embryos.” They argue that sex selection for this purpose is, in principle, morally acceptable.

Perhaps we need to clarify the moral framework of the discussion—or note its absence. It is interesting how a paper about science technology asserts moral acceptability without even mentioning the premises on which the assertion is based. Such a practice is particularly dangerous in that the moral acceptability of the matter simply becomes presumed: the matter is morally acceptable because the authors say it is morally acceptable. As more and more scientists and physicians comment on morality, we must be careful to ask on what basis they do so. Clear, well-founded analysis and solid moral foundations are needed.

Another article related to assisted reproductive technology appeared in the August issue of *Pediatrics* (B. Källén et al., “Cancer Risk in Children and Young Adults Conceived by In Vitro Fertilization”). The authors of this study followed twenty-six thousand children conceived by in vitro fertilization (IVF) who were born during the years 1982 to 2005, and compared them with children not conceived by IVF. After adjustment for factors such as maternal age, parity, and smoking, they found that high birth weight, premature delivery, presence of respiratory diagnoses, and low Apgar were risk factors for cancer. They found fifty-three children with cancer who were born after IVF, contrasted with thirty-eight expected cases. In effect, they found that IVF was associated with a moderately increased risk for cancer in children. Of the fifty-three children with cancer, twenty-eight were younger than three years at the time of cancer diagnosis, fourteen were from three to five years old, seven were between six and ten years old, and four were older than ten years. Seven

of the IVF children who had cancer also had a malformation diagnosis such as cleft lip or palate; coarctation of the aorta; musculoskeletal, arm, or kidney malformation; or Down syndrome. The authors note that the increased cancer risk is probably not attributable to the IVF procedure itself but maybe due to an unidentified confounding variable in women who undergo IVF or to something else.

### *Physician-Assisted Suicide*

Physician-assisted suicide continues to receive attention in the medical literature. In the *Journal of the American Geriatrics Society*, Dr. David Espino and colleagues report on the effect that ethnicity has on attitudes toward the practice of PAS (“Physician-Assisted Suicide Attitudes of Older Mexican-Americans and Non-Hispanic White Adults: Does Ethnicity Make a Difference?” July 2010). Many studies have explored attitudes toward PAS among different ethnic and racial groups, but little is known specifically about the view of older Mexican Americans. The investigators of this study conducted face-to-face interviews, administering a standardized survey to a convenience sample of 100 Mexican Americans (mean age, 70.1 years; 58 percent women) and 108 non-Hispanic whites (mean age, 72 years; 51 percent women). Logistic regression analysis revealed that male gender and Mexican American ethnicity predicted agreement with legalization of PAS, while religiosity predicted a negative attitude toward PAS. Overall, 52.7 percent of Mexican Americans in this study agreed with PAS, compared with 33.7 percent of non-Hispanic whites who agreed with PAS.

There are several limitations to this study, among them the small convenience sample and the use of a single question about PAS, which may limit the response variability and not reveal an accurate understanding of attitudes. Nonetheless, if the study does accurately indicate attitudes of Mexican Americans, we should not be surprised by PAS legalization in states that have of large Mexican American populations.

To date, PAS is legal in Oregon, Washington, and Montana.

### *Withdrawal of Life Support*

In the August 2010 issue of *Pediatrics*, Dr. Dominic Wilkinson announces an urgent need for improved research to establish reliable prognostic information in newborn infants with hypoxic-ischemic encephalopathy (“MRI and Withdrawal of Life Support from Newborn Infants with Hypoxic-Ischemic Encephalopathy”). He notes that the majority of deaths among infants with hypoxic-ischemic encephalopathy occur after the withdrawal of life-sustaining treatment. He also notes that magnetic resonance imaging and MR biomarkers, specifically proton MR spectroscopy, are purported to be the most accurate predictors of neurodevelopmental outcome in children with hypoxic-ischemic encephalopathy. Wilkinson sees “serious limitations” with existing studies that predict outcome in hypoxic-ischemic encephalopathy, however. And on the basis of current evidence concludes that “MR biomarkers alone are not sufficiently accurate to direct treatment-limitation decisions.”

### *Palliative Sedation*

In the July 26, 2010, issue of the *Archives of Internal Medicine*, authors of a brief report used a structured questionnaire to assess and compare the experiences

of physicians and nurses involved in providing continuous palliative sedation to the point of patient death (Siebe J. Swart et al., “Physicians’ and Nurses’ Experiences with Continuous Palliative Sedation in the Netherlands”). Data from 370 physicians and 185 nurses are reported. The mean age of the patients reported by physicians was seventy years, and the mean age of patients reported by nurses was sixty-five years. In both groups, cancer was the main diagnosis in the majority of patients. The most commonly reported severe symptoms before the start of continuous sedation were fatigue, pain, and longing for death—each reported in over 50 percent of the patients in each group. The physicians reported that the next two most frequent symptoms were loss of dignity and hopelessness, while the nurses reported hopelessness and dyspnea. In both groups, the majority (85 percent of physicians and 75 percent of nurses) reported that the physicians’ intention in using continuous sedation was not to hasten death. However, 41 percent of physicians and 28 percent of nurses reported that the effect of continuous sedation was to shorten life by less than two days (the majority of respondents) to more than two weeks. Palliative care remains an important and growing medical specialty. Sound moral principles need to accompany and inform its practice.

### *Moral Reasoning*

In the Winter 2007 issue of the *NCBQ*,<sup>1</sup> I mentioned an article on the effects of sleep deprivation on moral judgment.<sup>2</sup> In the August 1, 2010, issue of *Sleep*, the article “The Impact of Partial Sleep Deprivation on Moral Reasoning in Military Officers” no less attracted my attention (O. K. Olsen, S. Pallesen, and J. Eid). By way of brief background, the authors discuss how experts in the field of psychology of moral development theorize a staging system for cognitive moral development. Accordingly, the most mature moral level is characterized by autonomous reasoning based on universal moral principles such as justice and equality; such reasoning requires higher-order cognitive ability. A lesser stage, or moderate level, of cognitive moral development is conditioned by rules and regulations aimed at maintaining an established social order. At this level, the content of moral reasoning relies on an applied set of rules. The lowest level of moral reasoning, and the least mature, corresponds to a personal-interest process in which moral reasoning is conditioned by the pursuit of self-serving ends; it is characterized by the moral agent’s limited ability to view situations from another’s perspective. Very little is known about the effects of sleep deprivation on qualitative changes in moral reasoning; hence the general purpose of this study.

Seventy-one military cadets recruited from the Royal Norwegian Naval Academy and the Norwegian Army Academy participated in all parts of the study. A standardized test for assessing moral judgment (the Defining Issues Test–2) was used, in which subjects are presented with five moral dilemmas; for each dilemma,

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<sup>1</sup>See John M. Travaline, “Notes and Abstracts: Medicine,” *National Catholic Bioethics Quarterly* 7.4 (Winter 2007): 793.

<sup>2</sup>William D. S. Killgore et al., “The Effects of 53 Hours of Sleep Deprivation on Moral Judgment,” *Sleep* 30.3 (March 2007):345–352.

they are asked to rate the importance of twelve items according to each item's value in making decisions about the dilemma. The results provide three percentage scores corresponding to the three levels of moral reasoning: a P-score, for principled reasoning; an MN-score, for reasoning based on maintaining norms; and a PI-score, for reasoning based on personal interest.

In a repeated-measures fashion, all subjects were tested under both rested and sleep-deprived conditions. During a sleep-deprivation period of five days, subjects slept an average of two and a half hours a day. Degree of sleepiness was measured by the Stanford Sleepiness Scale. The major finding was that in subjects in a sleep-deprived state, the ability "to activate autonomous and principle-oriented moral reasoning" was impaired. Further, during sleep deprivation the subjects in general became more rule-oriented and self-oriented in their moral reasoning; this effect was greatest in those who were most inclined to apply principled moral reasoning when rested. These data are indeed interesting, reminding us of our complex natures and of the integral relationships among our physical well-being, our ability to reason, and our ability to make principled moral judgments.

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