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Buddhism, Brain Death, and Organ Transplantation

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Buddhism, Brain Death, and Organ Transplantation

Damien Keown*

Abstract

This article raises concerns about the degree to which potential donors are aware that their layman's understanding of death may not be the same as that enshrined in protocols employing the criterion of brain death. There would seem to be a need for greater public education of a kind which acknowledges the debate around the practical and conceptual difficulties associated with brain death, and makes clear what the implications of a diagnosis of brain death are for the donor and his or her relatives. The remainder of the article explores the discrepancy between the modern concept of brain death and the traditional Buddhist understanding of death as the loss of the body's organic integrity as opposed to simply the loss of its cerebral functions.

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Introduction

I first addressed the question of brain death in 1995 in the context of a discussion of end-of-life issues in my book *Buddhism and Bioethics* (1995, 2001). At that time I expressed the view that the concept of brain death would be acceptable to Buddhism, and that brain death was identical with human death. Since then, however, I have come to doubt this assessment and now believe that although brain death usually heralds the imminent demise of the patient it does not equate to death itself. I took the opportunity to express my thoughts briefly on this matter in a review of a recent book by Karma Lekshe Tsomo entitled *Into the Jaws of Yama, Lord of Death: Buddhism, Bioethics, and Death* (2006), and in the present article set out my thoughts on the matter more fully.¹ Karma Lekshe Tsomo is a Tibetan Buddhist nun, and it is mainly within Tibetan Buddhism that the problems she discusses concerning death and organ transplantation have come to the fore, no doubt because of the distinctive teachings of that school concerning death and dying. However, I believe there is an underlying problematic here for all schools of Buddhism revolving around a conflict between the motivation to help others and respect for the principle of *ahiṃsā*, or non-harming. My own construction of the Buddhist position,² to anticipate the conclusions which follow, anticipates serious reservations concerning the current medical practice of cadaver organ transplantation. This is not because Buddhism is opposed to organ donation *per se*, but because it rejects the concept of “brain death,” which is typically used to determine death prior to the harvesting of organs.³

Karma Lekshe Tsomo provides three reasons in support of organ donation.

Organ donation is considered a valuable opportunity on several levels. First, to donate one’s body for research or organ transplantation is a way to sever attachment to one’s own body.

Second, to place another person's welfare above one's own is a perfect expression of the bodhisattva ethic of compassion. Third, to donate one's organs with the pure motivation to benefit others will bring great fruits of merit in future lives, enabling one to gain a fortunate rebirth and further opportunities for Dharma practice; if the gift is dedicated to the enlightenment of all beings, the fruits are immeasurable. (Tsomo 156)

The above sums up the initial reaction of most Buddhists when the question of organ donation is raised. When informed about the details of the procedure, however, Tibetan lamas in particular change their view almost immediately because of their beliefs about the "subtle body." According to Tibetan teachings,⁴ even if there is no measurable brain activity, the subtle body is still functioning, "winds" and "drops" are still circulating, and consciousness is still resident in the body. As one authority sums it up:

This means that from a Tibetan point of view organ harvesting done within three days after the stoppage of the heart is basically the same as cutting organs out of a living being. And this causes great pain, as well as the accompanying negative mental states that one would generate if someone were to come up with a knife and cut you open and then take out organs. This of course would lead to a lower rebirth, so Tibetans generally wait three days before disposing of the corpse, which is three days longer than the organs are viable for transplant.⁵

Tibetan Buddhist views about death and dying have been adequately documented elsewhere and I will not describe them again here. The problems that arise in the context of organ transplantation, however, are not confined to Tibetan Buddhism (or even to Buddhism alone). In the discussion below, I will draw mainly on Theravādin sources, since I am more familiar with these. From this it should become clear that the

problem is a general one and raises issues which transcend sectarian boundaries.

Organ Donation

Although relatively few people will ever need an organ transplant, the subject of brain death will be of interest to anyone who wonders whether or not they should carry donor cards so their organs can be used after their death.⁶ Opportunities to become an organ donor are routinely provided on official documents in many countries, and consenting often involves little more than ticking a box.⁷ In doing so, the donor is consenting to undergo a major surgical operation in which one or more vital organs will be removed in circumstances which may have unappreciated implications both for the patient and any relatives in attendance at the time of death. The wording of such consent forms (which typically speak of providing the “gift of life” to someone “after my death”)⁸ offers no clear definition of what “death” is understood to mean or how it will be diagnosed. Although in most medical contexts this is not an issue, in the context of organ transplantation death may mean something rather different from what the layman imagines. Donors may be unaware, for instance, that following a diagnosis of brain death, organs are commonly removed before life support is discontinued, and while many vital signs are still being registered. Before the removal of organs, brain dead patients continue to receive nutrition, hydration and medication (unheard of in the case of a dead body), and they may even be resuscitated if necessary to preserve their organs. Such patients are warm, their metabolism is functioning, and movements of the limbs are often observed. It is not uncommon for an anesthetic to be administered to control the patient’s reactions, and not infrequently such “dead” patients have to be strapped to the operating table to control their spontaneous movements while the surgeons make an incision along the length of the torso and remove the organs while the heart is still beating. When the incision is

made, patients may react with an increase in blood pressure, heartbeat and adrenaline production, symptoms associated with stress or pain in other operations.⁹ Potential donors are rarely made aware that these facts, and whatever else the decision involves, the intensive medical interventions that are required mean that the patient will not be allowed to die peacefully surrounded by relatives, which is the kind of death most people would wish for themselves, and perhaps imagine they will undergo before their organs are harvested.

This is not to suggest that potential donors are deliberately misled, and transplant-facilitation websites provide abundant information in the form of FAQ files in an endeavor to anticipate donors' concerns. For obvious reasons, however, few provide the kind of information that might deter donors, and I have not seen any that suggest that the contemporary concept of brain death is in any way controversial, despite critiques in medical journals and elsewhere over several years.¹⁰

Commendably, some transplant websites attempt to address specifically religious concerns. Under its main FAQ, the UK Transplant website asks, "Are there religious objections to organ and tissue donation?" The answer is a reassuring negative: "No, none of the major religions in the UK object to organ and tissue donation and transplantation. If you have any doubts you should discuss them with your spiritual or religious adviser" (UK Transplant.org FAQ 24). Elsewhere, under a section titled "Religious Perspectives" the website states, "All the UK's major religions support organ donation and transplantation, and many actively promote it." However, the accompanying summary of the Buddhist position hardly suggests strong support for organ donation. The entry reads as follows:

- There are no injunctions in Buddhism for or against organ donation.

- In some traditions, the moment of death is defined according to criteria that differ from those of modern Western medicine, and there are differing views as to the acceptability of organ transplantation.
- The needs and wishes of the dying person must not be compromised by the wish to save a life. Each decision will depend on individual circumstances.
- Central to Buddhism is a wish to relieve suffering and there may be circumstances where organ donation may be seen as an act of generosity. Where it is truly the wish of the dying person, it would be seen in that light. (UK Transplant.org Religious Perspectives)

A survey of religious representatives sponsored by the UK Organ Donation Taskforce reported its findings in an August 2009 article entitled “Faith Leaders United in their Support for Organ Donation: Findings from the UK Organ Donation Taskforce Study” (Randhawa et al.). However, the discussions as reported did not explore any of the problematic issues surrounding the definition of death with interviewees, and the authors of the article recognize that “For many faiths, debate on organ donation is at an early stage and their views thus represent preliminary thoughts on what are complex moral and ethical issues” (2).¹¹ Perhaps this important qualification needs to be featured more prominently if potential donors from religious groups are to make an informed choice. The American website *Give Life; The Transplant Journey* is more circumspect with regard to Buddhism and under a section titled “Does my Religion Object to Donation?” states simply: “Buddhism: Donation is a matter of individual conscience” (Give Life).

Generosity (*dāna*)

It is certainly true that the motivation to help others is seen as a good thing by Buddhism. There are many examples of selfless giving throughout Buddhist literature. One thinks of Prince Vessantara, who gave away his kingdom, wife, and children, and there are more specific examples of generosity in connection with the donation of the body as food for animals and humans. In the well-known story of the bodhisattva and the hungry tigress found in the *Jatakamālā* and *Suvarnaprabhāsa Sūtra*, prince Mahasattva throws himself before a starving tigress and slits his throat with a splinter of wood so the tigress will eat his body. The *Sivi Jātaka* refers to the donation and transplantation of two eyes by King Sivi to a Brahmin,¹² and Har Dayal recounts many similar stories of *dāna* in his classic work *The Bodhisattva Doctrine in Buddhist Sanskrit Literature* (181ff). In his book *Burning for the Buddha*, James Benn lists examples from Chinese Buddhism of monks donating their own flesh as food or medicine for others. One of these was Daojin, a disciple of the great translator Dharmakṣema (385-433), who sliced the flesh from his own body, salted it, and donated it to starving villagers during a famine. Examples could be multiplied, but it seems clear that the donation of the body and its parts has a long literary history in Buddhist sources.¹³ At the same time, it needs to be born in mind that stories describing heroic deeds by advanced practitioners are perhaps best read as moral fables intended to inspire piety, rather than practical examples to follow in everyday life. A lay Buddhist who followed the example of Vessantara and gave away his children to the first person who asked for them would probably be regarded as criminally irresponsible rather than a model parent. Like other virtues, generosity needs to be moderated by prudence, and practiced in a balanced and appropriate way.

Defining Death

In order to explore the Buddhist perspective systematically with the aim of reaching practical and workable conclusions in harmony with Buddhist teachings and modern medical science, I think, in common with other contemporary philosophical discussions of death,¹⁴ we need to be able to do three things: (1) provide a Buddhist *definition* of death; (2) establish the *criteria* for declaring death; and (3) specify the empirical *tests* for death that will enable physicians to know when the criteria for death have been fulfilled. Tsomo, in her volume referred to earlier, offers no explicit definition of death or a defense of one. In fact she seems to have little hope of reconciling Buddhist and scientific viewpoints on questions of the kind I have just identified. This is because she sees the absence of any scientific means of detecting the presence of what she calls the “subtle consciousness” as a major obstacle to determining when death has occurred. According to traditional Tibetan teachings, death is believed to occur when this consciousness leaves the body to embark on its journey through the bardo, or intermediate realm, and for Tsomo this metaphysical belief appears to mark a point at which Buddhism and science must part company. While I agree that Buddhism may differ from current medical orthodoxy on the question of brain death, I do not believe it is for metaphysical reasons, or because religion and science are in some sense irreconcilable. Christianity has faced substantially the same predicament in terms of reconciling theological viewpoints on the relationship between soul and body with scientific beliefs about life and death, and has managed to evolve solutions that are thought consistent both with doctrine and science.¹⁵ In fact, the discipline of bioethics itself largely arose from efforts by Christian theologians in the 1960s to come to terms with the challenges that medical science presented to their beliefs. Buddhism now needs to engage in the same kind of critical reflection in order to derive moral conclusions that are compatible both with scientific fact and its own traditional beliefs and values.

Traditional Teachings on Death

Although Tibetan traditions surrounding death are rich and complex, there is an underlying continuity with their Indian counterparts in terms of what marks the difference between a living body and a dead one. The traditional Buddhist criteria are well known and are found in the Majjhima and Saṃyutta Nikāyas. Here, reference is made to three criteria that distinguish a living body from a dead body. The three are vitality (*āyu*), heat (*usmā*), and consciousness (*viññāṇa*) (S.iii.143). The first two, vitality and heat, are said to be interrelated and compared to a lamp and its light (M.i.295). For this reason I prefer to see them as representing a single phenomenon, namely the process of vitality and the accompanying heat which that process generates. In modern terms, perhaps vitality would correspond to the metabolic processes that take place in the body, and heat to the energy that these processes liberate. The absence of vitality, then, can be detected by the absence of heat. Bodily cooling is a widely recognized concomitant of death and is known as *algor mortis*, the process by which the temperature of a body drops from its normal 37 degrees centigrade, assuming normal conditions, until it reaches the ambient environmental temperature. Further observable signs include skin pallor, changes in the eyes such as loss of pressure and marking of red blood cells, flaccidity in the primary muscles, lividity or *livor mortis* (the process of blood flowing downwards and causing a reddish-purple color on the skin), *rigor mortis* which sets in three to four hours after death and lasts between thirty-six and forty-eight hours, and also, sometimes, spontaneous movements in the feet and legs caused by biochemical reactions (perhaps giving rise to a belief in spirit possession in some quarters).

Given the practice of the “cemetery meditations,” Buddhist monks must have observed many of these signs themselves, so it is interesting that the compilers of the Pāli canon came up with such a re-

stricted checklist—basically just the absence of heat—when determining death. I suggest that this has much to do with Buddhist meditational practice and the knowledge that individuals could enter trance-like states resembling death and remain there for some considerable length of time without respiration or heartbeat. Examples of stories such as that of the elder Mahanāga, who, according to Buddhaghosa (*Visuddhimagga* 706), remained seated in trance while the meditation hall burnt down around him, bear witness to this. Determining if such a person had passed away or not must have on occasion been a problem. Indeed, the *Mahāvedalla-sutta* of the Majjhima Nikāya specifically addresses the question of the difference between a person who is dead (*mato kālakato*) and one who is in the state of cessation (*saññāvedayitanirodho*) (M.i.296), so this was clearly a point of interest and concern.

Indeed we have an interesting canonical example of a wrong declaration of death being made in connection with the Buddha himself. The *Mahāparinibbāna-sutta* reports how the Buddha ascended through the eight *jhānas* and attained the state of *saññāvedayitanirodha* at which point Ānanda, despite his personal proximity to the Buddha over twenty-five years, was unable to determine whether his master was still alive or not. He turned to the Venerable Anuruddha for guidance and was informed that his master had not yet passed away but had attained “the cessation of perception and feeling” (*saññāvedayitanirodha*) (D.ii.156).¹⁶

The commentary explains that Ānanda thought the Buddha was dead because he saw no sign of respiration, and the commentary to the *Samyutta Nikāya* elaborates as follows:

Having seen the Blessed One taking no inbreath or outbreath when he had attained the cessation of perception and feeling, men and deities all at once cried out because they thought that the Master had attained parinibbāna. Ānanda Thera too asked the

elder Anuruddha if the Blessed One had attained parinibbāna. The elder replied that the Tathāgata had not yet attained parinibbāna, but had attained the cessation of perception and feeling. (SA.i.223)

The commentary to the Dīgha Nikāya continues: “Then they knew: ‘Now the Blessed One has attained cessation (*nirodha*); and within cessation death cannot occur’” (DA.ii.594). This is a reference to a belief that in the state of cessation all of the normal physiological processes are suspended and the subject exists in a state of suspended animation. The Buddha, at this point, was poised between life and death, and the death could not occur until he exited the state of cessation. Later Theravādin scholastic thought explains this phenomenon by reference to the concept of the *bhavaṅga*, or sub-consciousness, a stream of momentary moments of animating consciousness operating at an organic level.¹⁷ The commentator Dhammapāla explains that the process of dying requires *bhavaṅga* (presumably since death is an organic process as I will suggest below) and that the subject must emerge from the state of cessation in order to die because there is no *bhavaṅga* in the state itself.¹⁸ As can be seen from this example, the phenomenon of the state of cessation—a state in which the subject is alive but where the body generates no vital signs—presents major obstacles to any methodology which claims it can define the moment of death with precision.

Resuming the narrative of the Buddha’s death, we are told that after emerging from the state of cessation, the Buddha passed down through the *jhānas* to the first and again to the fourth at which point he expired. The text does not tell us how those present were sure the Buddha had actually died at this point. Perhaps clairvoyant powers came into play, or his body in due course became cold. Fortunately, in his case some rather dramatic confirmation was provided in the form of an earthquake and thunder, and it would be very convenient if such clear

signs were given in every case. Unfortunately, they are not, and we are left instead only with the two criteria the texts provide to help us distinguish between life and death: one biological (vitality manifested in the form of heat) and the other metaphysical (the presence of *viññāna* or consciousness).

In fact what these early sources provide us with, in terms of my earlier distinction, is actually a *definition* of death and an empirical *test* for death rolled up into one. The *Mahāvedalla-sutta* tells us that a body without vitality, heat, and consciousness is like an unconscious piece of wood (*yathā kaṭṭhaṃ acetanaṃ*). In other words, it is a corpse. Accordingly we might *define* death in religious or metaphysical terms as the permanent separation of the soul (or spirit) from the body. Buddhists might prefer a different form of words such as the separation of the immaterial (*nāma*) from the material (*rūpa*) components of the composite human individual. The *test* for death we are given to help determine when this separation has come about is the absence of heat in the body. So, the early sources have given us a start, but I think we can build further on these foundations. In particular, it would be good to evolve a definition which was less esoteric and could be accepted by Buddhists and non-Buddhists alike. Let us see if we can make any progress towards such a definition.

The Buddhist definition of death

An important preliminary point to clarify is whether our concept of death is one of the *death of the whole body*, or of the *death of the body as a whole*. The strictest definition of death would be the former since it would involve the destruction of every cell in the body, as might happen, for example, in an atomic blast. But this is surely too strict a requirement and in general we are happy to accept that people are dead long before their bodies are destroyed or reduced to ashes in the crematorium. The same might be said of putrefaction. Buddhist monks have often contem-

plated decaying corpses in the charnel ground and know that this is a process that takes some time, and that individuals are dead long before the flesh has decayed and the bones have turned to dust. I suggest, then, that the Buddhist understanding of death is that of the *death of the body as a whole* rather than the death of the whole of its parts.

The notion of disintegration seems to be a key element in the Buddhist concept of death. According to Buddhist teachings, the death of a human being occurs when the constitutive elements of the psychophysical individual lose their integrity. In traditional terminology this is thought to be when the mind-body composite made up of the five “aggregates” (*khandhas*) disintegrates. Another traditional way of speaking about this is by reference to the dissolution of the elements (*dhātu*) of earth, water, fire, wind, and consciousness. In this sense, perhaps we could say that death marks the point of transition from unity to multiplicity, or from a functioning whole organism to a collection of body parts. In its description of a dead body, the *Mahāvedalla-sutta* (i.296) refers to the sense-faculties (*indriya*) as “completely broken up” (*viparibhinna*). In other words, the senses of taste, touch, and smell etc have become disintegrated and their operation is no longer coordinated as they would be in a living self-regulating organism. It is this lack of integration that characterizes death and distinguishes it from life. Frequent reference is made elsewhere in Buddhist texts to death as the “break-up of the body” (*kāyassa bheda*), and I suggest this concept of break-up and disintegration is at the heart of Buddhist thinking about death. Once the break-up of the body takes place, the five aggregates are sundered, and the individual is dead. Since physical disintegration is a fundamental part of this process, and since there cannot be human life if there is no functioning organic basis for it, it seems we can define death not just in spiritual or metaphysical terms but also in biological ones. If as a result of physical disintegration the biological conditions necessary to support life are not present, there can be no living being. Or to put it another

way, if there is no integrated living body, there can be no mind-body aggregate, no five *khandhas*, and so no human being. Following this line of argument, then, a definition of death that might be acceptable to Buddhism without depending on, or making reference to, any specific Buddhist doctrine, could be (as I proposed in 1995): *death is the irreversible loss of integrated organic functioning* (Keown 158).

If the above is correct, it seems we can have two definitions of death: an esoteric and an exoteric one, and perhaps we can think of them as two sides of the same coin. If *viññāṇa*, or what Tsomo call the “subtle consciousness,” is indeed an integrated part of the functioning human being as Buddhist teachings suggest, then the definition of death as the loss of integrated functioning will also include the disintegration of the elements which compose a human being, of which the “subtle consciousness” is one. We learn from Tsomo (86f, 219) that just like modern doctors, traditional Tibetan physicians make use of tests which are purely physiological in nature, such as bodily heat, secretions, analyzing the urine of critically ill patients, taking the “death pulse,” and ultimately bodily putrefaction. Although Tibetans may regard these as testing for the presence of the subtle consciousness, it becomes clear on reflection that this is really only a corollary of what the tests show. Because death also occurs to entities such as vegetables (which according to mainstream Buddhist teachings do not possess consciousness and do not transmigrate) it is clear that life and death can be defined purely in biological terms independently of any reference to metaphysical entities.

My reason for providing an exoteric definition of death based on physiological criteria is that it allows Buddhist to build a bridge with medical science and other religions. This alternative definition makes no reference to a subtle consciousness or other metaphysical phenomena. Accounts of the death process in terms of “winds,” “humors,” and the

“clear light of death” may well retain a place for insiders, as in the case of those who undergo near-death experiences (NDE), or of Christians who believe the soul separates from the body on death. Reflective believers, however, will generally accept that such accounts must dovetail with the biological phenomena which accompany death and which are known to science.

The criteria for declaring death

Turning now to the *criteria* for declaring death, the problem is essentially one of specifying the physiological conditions that are a *sine qua non* for supporting the continuing relationship between the spiritual and material components (let us use the Buddhist terminology of *nāma* and *rūpa*) of the unitary human individual. Or, to put it the other way round, in the absence of what conditions can we be sure that there is no subsisting relationship between the two?

The early sources provide us with a test for death, namely the loss of bodily heat, but we now need to ask what that test is telling us. In other words, what conditions are fulfilled when a human body loses heat, and why are these conditions of importance? Is it the case, for instance, that a body loses heat at death because *viññāṇa* is hot, and when it goes the body cools? I would think not, so what we need is some further elucidation of the significance of this test in relation to our definition of death so that we can make the criteria for death more explicit. Given our earlier definition, our criteria for death should make reference to the point at which the basic life-support systems of an organism have broken down and irreversibly ceased to function. This is the point at which the biological integrity of the individual has been lost, and the *rūpa* or material form of the human body will begin an irreversible process of deterioration.

The criterion which is today almost universally accepted in modern medicine is that of brain death, either the death of the whole brain (as in the USA) or of the brain stem (as in the UK). This criterion was first proposed in 1968 and subsequently became established in the early 1980s. In 1981 it was incorporated into the Uniform Declaration of Death Act (UDDA), which has since been adopted by almost all fifty states of the USA.¹⁹ Tsomo is clearly unhappy with the criterion of brain death, and seems to assume this leaves Buddhism out on a limb and in some way opposed to science. I share her unease about brain death, but do not believe this places Buddhism at odds with science. In fact, a number of people, including doctors and philosophers, are skeptical about the brain death criterion, and there is a growing body of dissident literature²⁰ which believes that the criterion is conceptually and scientifically flawed.

The criterion as enshrined in the UDDA holds that death can be equated with “irreversible cessation of all functions of the entire brain,” but as critics point out there are serious problems with this definition and others like it. The first is that there are many such definitions and many associated protocols worldwide for the diagnosis of brain death, suggesting an underlying lack of scientific rigor surrounding the concept. Second, even if agreement existed on a single protocol, total *cessation* of brain function is rare in transplant candidates and residual vital signs continue to be registered (these are described more fully below). Third, the loss of *function* in an organ is not the same as the destruction of that organ: function can come and go in the way that a computer can be turned on and off while remaining fully serviceable: the fact that function is not presently observed does not mean that it cannot return. A fully secure definition of brain death would require nothing less than the total destruction of the brain tissue through necrosis (cell death), as occurs, for example, due to ischemia (loss of blood flow) over a period of time. If the brain were truly dead (as opposed to not being seen to func-

tion during a limited period of observation) it would provide strong evidence of human death, but this is not what the brain death protocol requires. A fourth difficulty is that the requirement for *irreversibility* is problematic, since irreversibility is a prognosis, not a demonstrable medical fact (many conditions once deemed “irreversible” are today easily curable). Fifth and finally, the tests for brain death are incapable by themselves of confirming the condition they are testing for without the prior exclusion of a range of other possible causes of coma, such as barbiturate poisoning or hypothermia. In other words, there is no fail-safe medical test (or group of tests) for brain death. In the last analysis the diagnosis of death by neurological criteria alone is difficult to support on the basis of scientific fact. Current methods used to diagnose brain death with a view to prompt transplantation, moreover, often involve haste and in many cases the proper protocols are not followed.²¹ The above concerns are of a kind that do not arise from metaphysical beliefs that are irreconcilable with science, but rather from the intrinsic weaknesses of a criterion for death that has become established in modern medical practice, largely, as many believe, in order to facilitate organ transplantation.²²

We may wonder why the brain has come to be seen of such importance in the diagnosis of death. There are two main reasons, the first medical and the second philosophical or cultural. The medical reason is that the brain is thought to coordinate or orchestrate all vital bodily functions, such that when it ceases to function a total “systems failure” involving the collapse of the cardiovascular and respiratory system is imminent. The second reason is that an influential strand of Western thought has come to identify consciousness with the self, a view summed up in Descartes’s famous dictum *cogito ergo sum*. Those who take a Cartesian or Lockean view of personal identity thus tend to see the loss of consciousness as equivalent to the death of the human person. Going beyond the current standard of brain death, some bioethicists who hold

this dualistic view of human nature (in terms of which self-consciousness is the unique defining characteristic of a human being) would be prepared to declare a permanently unconscious patient dead²³ even though the brain may be functioning, the heart beating, and respiration continuing unaided.²⁴

Often the medical and cultural reasons become blurred, and when the medical reasons are challenged, supporters of the brain death criterion fall back on reasons of a philosophical kind, conceding that the patient is not dead but is “as good as dead” due to being in a state similar to coma or “persistent vegetative state” (PVS). Indeed, there is often confusion in the minds of medical practitioners about what brain death actually involves, and many assume that it means simply permanent loss of consciousness. Loss of consciousness, however, even if permanent, is simply an impairment, and is quite different from bodily death understood as the irreversible loss of organic functioning, as defined earlier. While no one would wish to exist in a state of unconsciousness, such a judgment presupposes at a minimum that an unconscious patient is still alive. It may be noted in passing that the diagnosis of coma and PVS is far from straightforward, and errors are frequently made when assessing a patient’s level of conscious awareness.²⁵

I have never been persuaded that the philosophical reasons just mentioned (often used to support the position known “cognitive death”) are compatible with Buddhist teachings, and my earlier reasons for accepting the standard of brain death were of the medical kind, namely that the death of the brain, including the brain stem, seemed to mark the point at which the human organism loses the capacity for self-regulation (and not simply the capacity for consciousness). However, I have had increasing doubts about the scientific reliability of this criterion for two main reasons. The first is that it places too much emphasis on a single bodily organ, namely the brain. Vital though the brain is to

the exercise of the higher cognitive capacities and the regulation of important bodily systems, it seems to be going too far to equate the life of a human being with the functioning of a single organ. In fact for one period of our lives—namely during the early stages of fetal development—we exist without a brain at all. An early fetus has no functioning brain, and is therefore not conscious, but is undeniably alive. Another problematic example concerns the case of brain dead mothers who have subsequently gone on to give birth, in one case 107 days after brain death was diagnosed.²⁶ It seems strange to describe a woman's body functioning as an organic whole in this way—even to the extent of producing breast milk for her unborn child²⁷—as “dead,” and if medical opinion is saying that dead patients can give birth it would seem to have lost touch with the ordinary common-sense understanding of what the words “life” and “death” mean.

When all is said and done we do not live two lives—a brain life and a body life—and die two deaths—a brain death and a body death. One and the same life manifests itself in our brain and body, and throughout the psycho-physical unity which is a human being. According to Buddhist teachings, mental awareness (*mano-viññāna*) is not the essence of a human being (the doctrine of *anattā* denies there is any such essence), and is only one of six forms of consciousness diffused throughout the human body. Even though mental awareness may be lost temporarily or permanently, this does not mean that the deeper underlying forms of organic consciousness or *viññāna*—which I prefer to translate as “sentiency”²⁸—do not continue. For these reasons it seems overly narrow to determine life and death by reference to the brain alone, and we need to take a more holistic, organic view of the human individual in life if we are to understand what is lost in death.

The second kind of reasons collectively constitute what might be termed the problem of “vital signs,” alluded to above. This means simply

that after a diagnosis of brain death many vital signs are still being registered, which casts serious doubt on the accuracy of the diagnosis. This problem arises because the brain does not, as commonly thought, coordinate all vital bodily functions. For example, while the brain stem helps regulate heartbeat it does not cause it: the heart has its own internal pacemaker and can continue beating for some time even when totally removed from the body (up to an hour in the case of some animal hearts). In the case of the lungs, the ventilator simply introduces oxygenated air, while respiration (the exchange of gases with the environment) continues at the cellular level independently of the brain. A corpse cannot be ventilated; a ventilator will only support life in a body that is already alive. Apart from respiration, the neural regulation of body temperature also continues, and the spinal cord and peripheral nervous system still function, implying some level of continuing organic integration. Essential neurological functions also continue in the brain itself, such as the regulated secretion of hypothalamic hormones. EEG activity is detected in around twenty percent of brain-dead patients, and (as noted above) when an incision is made to retrieve organs the “dead” patient displays a cardiovascular response to stress in the form of increased blood pressure.

The continuation of multiple vital signs presents striking counter-evidence to a theory which claims that the loss of function in the brain is equivalent to death. This is experienced as emotional dissonance by relatives who are shown the warm body of a relative whose heart is beating while being told by doctors that the patient has passed away.

The tests for death

There is normally no problem about deciding if a person is alive or dead unless it has to be done in a hurry. The problem of making an early determination of death has arisen exclusively in the context of cadaver organ transplantation. For a successful transplant the organs must be

harvested while they are freshly oxygenated, and this usually takes place between six and twenty-four hours after brain death has been declared. In the interim, artificial ventilation is maintained and respiration and heartbeat continue. The body retains its normal vital signs which include the presence of heat. If ventilation is discontinued and the body is allowed to cool, the internal organs would rapidly deteriorate and the prospects for a successful transplant would be greatly reduced.

The classical Buddhist definition of death in terms of the loss of heat makes no reference to the brain at all, or to any other bodily organ. This is not surprising given the experience of profound states of suspended animation induced by meditation, such as cessation (*nirodha*). Even at lower levels of absorption, such as the fourth *jhāna*, respiration ceases altogether (S.iv.217), which is clearly why the absence of respiration is similarly not regarded as an adequate test for death. However, the traditional Buddhist test for death—loss of bodily heat—can, I think, be associated quite successfully with the definition of death I offered earlier, namely that death is the permanent loss of integrated organic functioning. The absence of heat is simply one way of telling us that the internal self-regulation of the organism has been irreversibly lost and that the body's metabolic processes have ceased.

A problem with the Buddhist test of heat loss is that it takes rather a long time before death can be declared. Loss of heat on the skin takes from eight to twelve hours, but the centre of the body takes about three times as long to cool down to the ambient temperature. If one wanted to wait for confirmation of death following the total loss of bodily heat, there would seem no reason not to do so in normal circumstances, subject to demands on hospital resources. After all, the dead are in no hurry. However, in practice I think doctors would not want to confine themselves simply to testing for bodily heat, and there are traditional tests for death which have served doctors well long before the

advent of the brain death criterion. Before then, the loss of heartbeat and respiration were the main tests used. Tests developed for brain death can provide additional confirmation, and using a combination of traditional and more recent tests one would know very soon and with a high degree of confidence that death had taken place. If we want to be more specific, a robust set of tests would seem to be one that referenced the cardiovascular, respiratory and nervous systems. The breakdown of these three major bodily systems appears to confirm the irreversible loss of structural integrity.

Organ Transplantation

As suggested above, the concept of brain death was invented largely to enable the transplant of organs. The weakness of the concept itself has become increasingly apparent over the past forty years, and recently even leading supporters of transplantation have accepted it is no longer coherent. Writing recently in the *New England Journal of Medicine*, Dr. Robert D. Truog goes so far as to call frankly for the abandonment of the “dead donor rule” (the requirement that the donor must be declared dead before the removal of organs) and its replacement with a system of informed consent that would allow the removal of organs without having to conform to the present “flawed definitions of death” (i.e. brain death). He suggests that use of the brain-death standard to legitimize explantation “suggests that the medical profession has been gerrymandering the definition of death to carefully conform with conditions that are most favourable for transplantation” (Truog 675). He sums up as follows:

The concept of brain death has served us well and has been the ethical and legal justification for thousands of lifesaving donations and transplantations. Even so, there have been persistent questions about whether patients with massive brain injury, apnea [inability to breathe], and loss of brain-stem reflexes are

really dead. After all, when the injury is entirely intercranial, these patients look very much alive: they are warm and pink; they digest and metabolize food, excrete waste, undergo sexual maturation, and can even reproduce. To a casual observer, they look just like patients who are receiving long-term artificial ventilation and are asleep. (Truog 674)

“The arguments about why these patients should be considered dead,” he adds, “have never been fully convincing.” Truog’s views were summed up in a recent critical publication by British philosopher David S. Oderberg, who writes:

Bioethicists Robert Truog and Franklin Miller suggested that since surgeons have for many years not really been adhering to any viable criterion of death before extracting a person’s organs, this suggests that neither they nor anyone else involved considers the “dead donor” rule to be anything but an ethical fig leaf—vague, indefinable, but used as an excuse to assuage one’s conscience before transplantation is performed. Far better, they believe, to leave the issue to the “informed consent” of patients or their surrogates. Whether the “donor” is dead or alive is of no ethical importance. (Oderberg 98-109)²⁹

In a similar vein, an editorial in *Nature* in October 2009, openly recognizing the scientific ambiguity surrounding current definitions of brain death, stated “The time has come for a serious discussion on redrafting laws that push doctors towards a form of deceit.” “Ideally,” it stated, “the law should be changed to describe more accurately and honestly the way that death is determined in clinical practice” (570).³⁰ If public opinion and legislatures can be persuaded by such arguments, the current practice of organ transplantation may well accelerate, and donors would at least be able to make a truly informed choice in the knowledge that death had been medically redefined to no longer mean what most

people thought it meant. The danger, however, is that once death no longer has a clear organic basis, such redefinition could continue indefinitely, and widen progressively to include in its scope people who were a little “less dead” each time.

Conclusion

This article began by raising concerns about informed consent, and the degree to which potential donors are aware that their layman’s understanding of death may not be the same as that enshrined in protocols employing the criterion of brain death. There would seem to be a need for greater public education of a kind which acknowledges the debate around the practical and conceptual difficulties associated with brain death, and makes clear what the implications of a diagnosis of brain death are for the donor and his or her relatives. The remainder of the article explored the discrepancy between the modern concept of brain death and the traditional Buddhist understanding of death as the loss of the body’s organic integrity as opposed to simply the loss of its cerebral functions. The central concern here is that if brain-dead patients are not really dead, to practice solid organ explantation—such as the removal of the heart, liver, kidney or pancreas from a beating-heart donor—would itself cause the somatic death of the patient. The fact that this is done with the intention of saving life may be a mitigating factor, but in Buddhist terms it still constitutes the intentional killing of a living being. The fact that none of this is done in the patient’s own interest gives further grounds for caution.

So where does this leave us on the ethics of organ transplantation? The conclusion seems to be that the brain death criterion is incompatible with what major Buddhist schools teach about the time of death. If this is so, it raises concerns for Buddhists who wish to support organ donation programs since their religion defines death differently to current medical practice. The caution of the early sources—which do not

even accept cessation of respiration or pulse as proof of death—has to be taken seriously, and the simple loss of function in parts (or even all) of the brain would seem too uncertain an indicator on which to base judgments which could involve the destruction of human life. There is no “magic moment” at which life ends, and in the absence of earthquakes, thunder, or the appearance of Māra hovering nearby, it seems safest to wait until events have conclusively taken their course. The alternative criteria I have proposed, namely the breakdown of the three main systems—cardiovascular, respiratory, and neurological—would allow an earlier diagnosis of death than the loss of bodily heat but would also make organ transplantation impractical.

When all is said and done, death remains a mystery and it would be unwise to assume certainty about the nature of the last moments we have on earth. As we saw in the case of the Buddha, traditional Buddhist teachings concerning the state of cessation (*nirodha*) mean a person can be alive without registering any detectable vital signs. In such matters, therefore, it is safer to proceed with caution, not from superstition or irrationality but in acceptance of the limitations of human knowledge and out of respect for the dying as they prepare themselves for their transition to the next life. If there is doubt about precisely when death occurs, the benefit of the doubt must be given to the dying patient rather than to those who have a vested interest in his death. Inevitably this will lead to a loss of donor organs for transplantation, as a result of which many lives will be lost (the only acceptable form of transplantation would seem to be that of paired organs between living donors). There is no way to disguise that this is a hard choice and entails difficult consequences. In order to mitigate the damage, resources expended on transplantation could be directed into the development of new drugs and alternative techniques. Possible treatments include the development of artificial hearts, and the use of adult stem cells supplied by the patient to grow replacement organs. This would have the advantage of avoiding prob-

lems of rejection and the serious side-effects of immunodepressant drugs. Xenotransplantation (transplanting organs from animals) offers another possible way forward, although the ethical implications of this for Buddhists are as yet unexplored. None of these techniques will deliver results in the short term, but so long as transplantation is seen as the primary medical solution to organ failure the alternatives will not receive the attention and funding they deserve. A further public policy issue concerns public trust and confidence in the medical profession. Brain death has become an article of faith for the profession, and in spite of its defects, has become widely accepted due to the public's trust in health care professionals.³¹ If this trust is weakened, confidence in other areas of medical practice will be undermined, and it will not serve the interests of either doctors or their patients to sustain a flawed criterion of death in the long term.

Notes

¹ This is a revised and expanded version of "Buddhism, Death and Organ Transplantation," first published in the *Journal of the International Association of Buddhist Universities* 1 (2008), 57-70. I am grateful to the publishers for permission to reuse the material here.

² For reflections on what might constitute a "Buddhist view," see Keown 1995, 12ff.

³ As far as I am aware, however, there has been no widespread public discussion of the validity of the concept of brain death from a Buddhist perspective in any country, even Japan, where there is otherwise considerable public opposition to organ transplantation despite recent (2009) legislation recognizing the concept of brain death. On the contrast be-

tween Japanese and American attitudes to transplantation see LaFleur 2001.

⁴ These are described in detail by Tsomo and in other works, including: Powers 1995, Lati Rinpoche and Hopkins 1981, and Sogyal Rinpoche 1998.

⁵ The words of an anonymous JBE reviewer, to whom I am grateful for these and other suggestions.

⁶ In the USA, there are approximately 100,000 registrations for transplants at any given time, the vast majority for kidneys and livers (real-time statistics are available from the website of The Organ Procurement and Transplantation Network at www.optn.org). The number of actual *patients* will be fewer than the number of registrations since some patients will be registered for more than one organ. In the UK, information provided by UK Transplant (www.uktransplant.org) lists around 8,000 registrations for transplants, of which just under 7,000 are for kidneys. The site claims that 25 percent of the UK population has joined the “opt in” NHS Organ Donation Register. In September 2008 an Organ Donation Taskforce assessed proposals for a change to a national “opt out” system under which consent to organ donation would be presumed unless individuals specifically exempted themselves. Sweden, Austria and Spain already have such a system. In the USA, a system of “required request” or “required referral” operates under which doctors must make enquiries regarding the possible use of the organs of any patient diagnosed as brain dead.

⁷ For a perceptive discussion of the cultural reasons facilitating public acceptance of organ transplantation in the West see LaFleur 2001.

⁸ The wording of the UK form is “I want to donate the following for transplantation after my death,” followed by a list of options.

⁹ There is debate around the interpretation of these reactions, and some doctors dismiss them simply as “reflexes,” but this begs the question as to whether the patient is alive or dead since a living body also exhibits identical “reflexes.”

¹⁰ The UK Transplant website, for example, provides very full information on many aspects of transplant procedure. What it fails to address in its otherwise exemplary FAQ, however, is the central question of whether brain death is really the same as human death. It poses the question “How do they know you are really dead?” (question 7), and in response reassures inquirers that “Organs are only removed for transplantation after a person has died,” adding that “death is diagnosed by brain stem tests” by “two experienced doctors” using “clear and strict standards and procedures.” There is no reference to debates around the validity of the tests themselves and the concept of death they are based on, and no hint is given that the concept of brain death is in any way controversial (UK Transplant.org FAQ 7).

¹¹ For a selection of religious views (including Buddhist) on the related matter of the withdrawal of treatment see Ankeny et al. 2005.

¹² Perhaps this is why the establishment of an “eye bank” in Sri Lanka has been so successful. According to Ven. Dr. Sobhita Thera: “Buddhism’s influence has made the Sri Lanka Eye Bank the biggest in the world and had helped millions of people in 169 countries regain their sight” (4ui.com).

¹³ Clearly, such giving is only possible when the gift is voluntary, so under a system of “presumed consent” whereby organs are taken rather than given, as operated in European countries like Spain, Austria, and Sweden, such “donation” would not seem to be in keeping with the altruistic spirit of these textual examples. Also of interest is Simpson 2004.

¹⁴ The literature is abundant. See, for example, Gervais 1986 and Youngner et al. 1999.

¹⁵ This is not to suggest that the positions reached are unchangeable. For example, there have recently been suggestions that the position of the Vatican on brain death may be under review. The Vatican originally accepted that brain death represented human death, but a more skeptical tone is now detected by some observers. See, for example, the report of a meeting of the Pontifical Academy of Sciences in early February 2005 at http://initiative-ka0.de/KA0-Braindeath_is_not_death.htm (accessed 27 September 2008).

¹⁶ D.ii.156. Atha kho āyasmā ānando āyasmantaṃ anuruddhaṃ etadavoca – “parinibbuto, bhante anuruddha, bhagavā”ti. “Nāvuso ānanda, bhagavā parinibbuto, saññāvedayitanirodhaṃ samāpanno”ti.

¹⁷ Cf. Vism 707.

¹⁸ Yang-Gyu An, *op cit*, p.185 n.3.

¹⁹ Section one of the Act entitled “Determination of Death” states: “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.”

²⁰ E.g. Potts et al. 2000.

²¹ For a study of pediatric donors, see Verheijde et al. “Growing Concerns” pp.1-6. and, by the same authors, “Organ Procurement.”

²² Another reason commonly cited for the acceptance of the brain death criterion is that it allows the discontinuing of life-prolonging measures without incurring possible legal sanctions.

²³ A leading proponent of this view is Robert M. Veatch, most recently in the *New England Journal of Medicine*. Veatch claims that perhaps a third of Americans support a higher-brain or consciousness-based definition of death and suggests that an amendment is needed to the “dead donor rule” (the principle that organs should only be removed from a dead donor) to allow transplants from patients who are still alive but permanently unconscious. Some bioethicists even argue that there is a moral case for non-voluntary euthanasia to be performed on *conscious* patients diagnosed with “locked in” syndrome (see Kahane and Savulescu 2009).

²⁴ See, for example, the views of Dr. Robert Truog mentioned below.

²⁵ A recent study of “vegetative” patients using MRI scanners revealed brain activity in around 10% consistent with some level of awareness and cognition, as well as basic communication abilities. M. M. Monti and others “Willful Modulation of Brain Activity in Disorders of Consciousness,” *New England Journal of Medicine*, Online edition 18 February 2010, <http://content.nejm.org/cgi/content/full/NEJMoa0905370>.

²⁶ See, for example, Field et al. 1988.

²⁷ According to information on the anti-brain death website KAO, “The production of breast milk depends on a signal sent from the anterior lobe of the pituitary that stimulates the secretion of milk, and possibly breast growth, thus requiring a functioning brain” (KAO.de). Recall that the standard definition of brain death requires the loss of all brain function.

²⁸ This is to avoid confusion with the notion of a “stream of ideas” that the word “consciousness” typically evokes.

²⁹ David S. Oderberg, “Bioethics Today,” *The Human Life Review* 98, Fall 2008, 98-109.

³⁰ “Delimiting Death,” *Nature* 461, (October 2009):570 or <http://www.nature.com/nature/journal/v461/n7264/full/461570a.html>.

³¹ Japan is the exception due in no small part to the general lack of trust in doctors on the part of the public.

Bibliography

4ui.com. Online. Available HTTP: <http://www.4ui.com/eart/159eart1.htm>. (accessed 3 November 2009).

Ankeny, Rachel A., Ross Clifford, Christopher F. C. Jordens, Ian H. Kerridge, and Rod Benson. “Religious Perspectives on Withdrawal of Treatment from Patients with Multiple Organ Failure,” *The Medical Journal of Australia* 183, no. 11/12 (2005), 616-621. Online. Available http://www.mja.com.au/public/issues/183_11_051205/ank10614_fm.html. (accessed 4 November 2009).

Benn, James A. *Burning for the Buddha: Self-Immolation in Chinese Buddhism*. Honolulu, HI: University of Hawaii Press, 2007.

Dayal, Har. *The Bodhisattva Doctrine in Buddhist Sanskrit Literature*. Delhi: Motilal Banarsidass, 1999.

Field, D. R., E. A. Gates, R. K. Creasy, A. R. Jonsen and R. K. Laros, Jr. "Maternal Brain Death during Pregnancy, Medical and ethical issues," *Journal of the American Medical Association* 260 (1988), 816-822.

Gervais, Karen Granstrand. *Redefining Death*. New Haven, CT: Yale University Press, 1986.

Give Life; The Transplant Journey. Online. Available: http://www.journey.transweb.org/donor_journey/education/step4/moreinfo4_right_frame8.htm, (accessed 4 November 2009).

KAO.de. Online. Available HTTP: http://initiative-ka0.de/KA0-Brain-death_is_not_death.htm, (accessed 27 September 2008).

Kahane, Guy and Julian Savulescu. "Brain Damage and the Moral Significance of Consciousness," *The Journal of Medicine and Philosophy* 32, no. 1 (2009) 6-26. (Abstract online at <http://jmp.oxfordjournals.org/cgi/content/abstract/34/1/6>. (accessed 24 November 2009).

Keown, Damien. *Buddhism and Bioethics*. Basingstoke: Macmillan, 1995. Reissued by Palgrave, 2001.

_____. Review of *Into the Jaws of Yama, Lord of Death: Buddhism, Bioethics, and Death* by Karma Lekshe Tsomo. *Journal of Buddhist-Christian Studies* 28, 2008:157-161.

_____. "Buddhism, Death and Organ Transplantation." *Journal of the International Association of Buddhist Universities* 1 (2008), 57-70.

LaFleur, William R. "From Agapé to Organs: Religious Differences Between Japan and America in Judging the Ethics of the Transplant" in Joseph Runzo and Nancy M. Martin (eds.) *Ethics in the World Religions*. Oxford: Oneworld Publications, 2001:271-290.

Nature 461, October 2009 570; editorial “Delimiting Death.” Also available at <http://www.nature.com/nature/journal/v461/n7264/full/461570a.html>.

Oderberg, David S. “Bioethics Today,” *The Human Life Review* 98, (Fall 2008) 98-109.

Potts, M., P. A. Byrne and R. G. Nilges. *Beyond Brain Death: The Case Against Brain Based Criteria for Human Death*. Boston: Dordrecht, 2000.

Powers, John. *Introduction to Tibetan Buddhism* (revised edition), Ithaca, NY: Snow Lion, 1995.

Randhawa, Gurch, Anna Brocklehurst, Ruth Pateman, Suzannah Kinsella, and Vivienne Parry. “Faith Leaders United in their Support for Organ Donation: Findings from the UK Organ Donation Taskforce Study,” *Transplant International*. 10 August 2009, doi 10.1111/j.1432-2277.2009.00952.x.

Rinpoche, Lati and Jeffrey Hopkins. *Death, Intermediate State and Rebirth in Tibetan Buddhism*. Ithaca, NY: Snow Lion, 1981.

Rinpoche, Sogyal. *The Tibetan Book of Living and Dying*, London: Rider, 1998.

Simpson, Bob. “Impossible Gifts: Bodies, Buddhism and Bioethics in Contemporary Sri Lanka,” *Journal of the Royal Anthropological Institute*, Vol.10 (2004).

Truog, Robert D. “The Dead Donor Rule and Organ Transplantation,” *New England Journal of Medicine* 359, no. 7 (2008).

Tsomo, Karma Lekshe. *Into the Jaws of Yama, Lord of Death: Buddhism, Bioethics, and Death*. Albany, NY: SUNY, 2006.

UK Transplant .org. "FAQ 7." Online. Available HTTP: http://www.organdonation.nhs.uk/ukt//how_to_become_a_donor/questions/answers/answers_3.jsp#q8. (accessed 3 December 2009).

UK Transplant.org. "FAQ 24." Online. Available HTTP: http://www.uktransplant.org.uk/ukt/how_to_become_a_donor/questions/answers/answers_9.jsp. (accessed 3 December 2009).

UK Transplant.org. "Religious Perspectives." Online. Available HTTP: http://www.uktransplant.org.uk/ukt/newsroom/fact_sheets/religious_perspectives.jsp. (accessed 22 September 2008).

Veatch, Robert M. "Donating Hearts After Cardiac Death—Reversing the Irreversible," *New England Journal of Medicine* 359, no. 7 (2008).

Verheijde, Joseph L., Mohamed Y.Rady, and Joan L.McGregor, "Growing Concerns about Brain Death and Organ Donation," *Indian Pediatrics* 45(November 17, 2008).

Verheijde, Joseph L., Mohamed Y.Rady, and Joan L.McGregor. "Organ Procurement After Cardiocirculatory Death: A Critical Analysis." *J Intensive Care Med* 23 (2008), 303-312.

Youngner, Stuart J., Robert M. Arnold, Renie Schapiro (eds.). *The Definition of Death: Contemporary Controversies*. Baltimore: John Hopkins University Press, 1999.