

KILLING EMBRYOS FOR STEM CELL RESEARCH

JEFF MCMAHAN

Abstract: The main objection to human embryonic stem cell research is that it involves killing human embryos, which are essentially beings of the same sort that you and I are. This objection presupposes that we once existed as early embryos and that we had the same moral status then that we have now. This essay challenges both those presuppositions, but focuses primarily on the first. I argue first that these presuppositions are incompatible with widely accepted beliefs about both assisted conception and monozygotic twinning. I then argue that we never existed as embryos. If this last claim is right, killing an embryo does not kill someone like you or me but merely prevents one of us from existing.

Keywords: embryo, stem cells, ethics, killing, assisted conception.

1. Two Assumptions

Those who object to human embryonic stem cell (hESC) research believe that it is seriously morally objectionable to kill embryos, and most believe that it is also objectionable to allow them to die or to create them solely for certain instrumental purposes. Thus, when it was announced in August 2006 that researchers had discovered a way to harvest embryonic stem cells (hESCs) from embryos created for reproductive purposes without destroying the embryos—a way that would allow the embryos to live and be implanted—one might have expected that everyone who had previously opposed the research would have welcomed the prospect of having the medical benefits of hESC research without having to harm any embryos. But the general reaction to the announcement by those who had been opponents was to reiterate their opposition. In some respects this is baffling, though it may simply reflect the belief that the new technique is merely a Trojan horse, and that going forward with hESC research in any form will inevitably result in the deliberate destruction of embryos.

This belief is not entirely unwarranted. Much of the therapeutic promise of hESC research lies in the prospect of our being able to clone an embryo from a particular individual, derive stem cells from it, and use those stem cells to grow tissue or even an organ that would be an exact

genetic match of that to be restored or replaced, thereby obviating problems of immunologic rejection. Even if the cloned embryo could survive the process whereby the stem cells would be derived, it would not have been created for reproductive purposes, and there would be no obvious way of enabling it to survive, especially if its source were male. There are, moreover, a great many people who support therapeutic cloning but are opposed to reproductive cloning. For these people, there would be a positive reason to destroy the cloned embryo after deriving stem cells from it. So, all things considered, the opponents of hESC research are probably right to be skeptical of the suggestion that this research can be pursued in a way that will avoid the killing of embryos. (Of course, a surviving embryo from which stem cells had been obtained would not have to be killed even if it were not going to be enabled to develop biologically. It could instead be indefinitely frozen. But if we assume that the embryo is the kind of entity for which things can be better or worse, it seems that to be killed would be no worse for the embryo than to be frozen with no prospect of ever being enabled to live and develop.)

Those who believe that the killing of human embryos is wrong typically support their view by claiming that embryos are innocent human beings, and that innocent human beings must be protected, not harmed or destroyed or used solely as a means of benefiting others. This is what President George W. Bush claims to believe, perhaps after conferring with the same Higher Power whom he claimed to have consulted about invading Iraq and who advised him to go ahead.¹ (The identity of this Higher Power is, however, not altogether certain. Cynics suspect that it is really a group of voters known as the “religious right.”)

Some reasons for believing that embryos are innocent human beings whom it is wrong to kill are religious in character. There are, however, two assumptions that I believe capture the essence of the religious concern but are also compatible with secular morality. I will focus my discussion on these. They are:

- (1) The embryo is the earliest stage in the existence of someone like you or me. That is, we were once embryos.
- (2) We have the same moral status at all times at which we exist. We mattered just as much when we were embryos as we do now.

I believe that both of these assumptions are false. For the most part, my challenges to the second assumption will be intuitive; for example, my argument in sections 2 and 3 is that our practices suggest that we really do not believe that embryos have the same status as children and adults. But even apart from its conflict with certain intuitions, the second assumption seems incompatible with the claim that many of the moral reasons why we

¹ “President Discusses Stem Cell Research,” 9 August 2001, available at <http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html> (last accessed on 23 October 2006).

have to treat an individual in certain ways and not treat that individual in other ways are given by that individual's intrinsic *nature*. If you were once an embryo, your nature was very different then from what it is now. It is reasonable to think that your moral status was correspondingly different, so that it may have been permissible to treat you then in ways that would be impermissible now. It seems implausible to suppose that radical changes in an individual's nature can never affect that individual's basic moral status.

If you were never an embryo, however, the question of what your status was as an embryo cannot arise. My main aim in this essay is to offer reasons for thinking that we were never embryos. I will focus on embryos at a very early stage in their development. The best time to intervene to derive stem cells by the traditional method that involves killing the embryo is a little less than a week after conception, when the embryo—or, technically, blastocyst—is five or six days old. I will therefore consider whether it is plausible to suppose that we were once six-day-old embryos.

2. Assisted Conception

First, however, I will examine two grounds for skepticism about the two assumptions that commonly underlie people's opposition to hESC research. In each case the claim is that the conjunction of these two assumptions is incompatible with some other common and well-supported belief. One of these claims is, I think, weaker than one might initially suppose. The other is quite strong. I will begin with the weaker of the two.

As a society, we have come to accept assisted conception, even though it involves the creation of more embryos than will be implanted. It is now a socially accepted practice to create a number of embryos *in vitro*, select one or more for implantation, and either allow the remainder to die, to kill them, or, more commonly, to freeze them indefinitely so that they continue to exist in a state in which they are neither alive nor dead.

Some claim that if, as our second assumption asserts, an embryo has the same moral status that you and I have now, so that it is wrong to kill it for its stem cells, then it should also be wrong deliberately to create embryos in the knowledge that many of them will never be implanted.

But the matter is not so simple. It can be argued, for example, that while assisted conception involves creating embryos in the knowledge that each will have a relatively small chance of survival, the same is true, though to a somewhat lesser degree, of natural conception. An embryo created through natural conception has only about a 30 percent chance of surviving to birth. But no one suggests that natural conception is, for this reason, wrong, or that it *would* be wrong if the probability of survival were significantly lower than it is.

Still, even if each embryo's probability of survival were no lower in assisted conception than in natural conception, that would not show that

the treatment of embryos in the process of assisted conception would be as benign as it is in natural conception. Naturally conceived embryos that are spontaneously aborted can very seldom be saved; their deaths are an unavoidable side effect of the procreative process. But in assisted conception, embryos that could in principle be saved are often allowed to die without any effort being made to save them. Moreover, the procedure could be done in such a way that embryos would be created and implanted only one at a time. Performed in this way, the procedure would be significantly less efficient and less successful, but if embryos have a high moral status, perhaps we should accept these costs in order to avoid creating embryos when we know that many of those created will never be implanted.

So, given the assumption that a human embryo has the same moral status that you and I have, there are reasons for thinking that assisted conception is morally objectionable on grounds that do not apply to natural conception. But this is not sufficient to show that those who oppose hESC research by appealing to the status of the embryo are thereby committed to opposing assisted conception as well, even as it is currently practiced. For there are also reasons for thinking that even if assisted conception involves treating some embryos in a morally objectionable way, hESC research treats embryos in a significantly more objectionable way. This seems true, in any case, of the current technique for deriving stem cells, which has involved the killing of embryos and in its projected applications would require both the creation and the subsequent killing of embryos. Both killing the embryo for its cells and creating and then killing it treat it merely as a means. In assisted conception, by contrast, nothing bad is intended for any embryo, no embryo is used merely as a means, and each embryo created gets some chance at life.

Indeed, it might be argued that assisted conception is not bad, or worse, for any embryo. For it is not intrinsically bad to be caused to exist in a nonconscious state for only a brief period, and to exist in this state is certainly not worse than never to exist at all. That an individual's life will be brief is not, in general, a reason not to cause that individual to exist. Yet, while this is true, it does not show that assisted conception is unobjectionable. For the same claims can be made about causing an embryo to exist and then killing it in the process of deriving stem cells from it.

Suppose that the course of action that involves causing an embryo to exist and killing it to get stem cells is wrong. The alternative to this course of action, considered as a unit, is not to cause the embryo to exist at all. For embryos created for the purpose of hESC research would otherwise not be created at all. And, as I noted, it would not, in such a case, have been better for the embryo never to exist. In part, this is just a matter of logic. If the embryo had never existed, that could not have been better *for*

it, as there can be no one for whom never existing can be either better or worse. But there is also a substantive claim here that is often expressed by saying that having been caused to exist was not worse for an individual than never existing. This is the claim that the life is worth living.

So what makes the course of action that involves both causing an embryo to exist and then killing it wrong (assuming for the moment that it *is* wrong) is that it involves killing. Causing the embryo to exist is objectionable as a component of the unit only because it is done in order to make the killing possible. So it is in fact morally irrelevant that the course of action consisting of causing the embryo to exist and then killing it is not bad for the embryo or worse for it than never existing. For the relevant comparison is between killing the embryo and allowing or enabling it to continue to exist. And while it is not worse for the embryo to exist and be killed than never to exist, it *is* worse for it to be killed than to be allowed or enabled to continue to live.

Similarly, the relevant comparison for evaluating assisted conception is not between causing embryos to exist for a brief period and not causing them to exist at all. It is instead between, on the one hand, killing the supernumerary embryos, allowing them to die, or freezing them indefinitely and, on the other, enabling them to continue to exist. And if killing an embryo is worse for it than allowing or enabling it to continue to exist, then allowing it die, or freezing it and allowing it to die only later, is also worse for it than enabling it to continue to exist—though, assuming that the distinction between killing and letting die has moral significance, allowing the embryo to die may be *less* morally objectionable than killing it.

This could, of course, be a morally significant difference between hESC research and assisted conception, if the former requires the killing of the embryo, while the latter does not. Indeed, if supernumerary embryos can be kept frozen for as long as we ourselves survive, they need never even be allowed to die. It is, however, hard to see how being frozen at time *t*, remaining indefinitely cryogenically preserved, and then dying without experiencing consciousness upon thawing could be better than simply being allowed to die at *t*. Being frozen is better than being allowed to die only because it leaves open the possibility of being restored to life. But if being frozen but never implanted is no better for an embryo than simply being allowed to die, then the practice of freezing supernumerary embryos produced in the process of assisted conception accomplishes rather little that is of moral significance. For the vast majority of embryos that are frozen cannot, though for contingent reasons, be enabled to develop into adult persons and thus will have to be allowed to die at some point. Freezing them simply defers their deaths without extending their lives, while shifting the responsibility for allowing them to die to our successors. (It is for this reason that it was deceptive and manipulative posturing for Bush to surrounded himself with babies developed from supernumerary

embryos when he announced his veto of legislation that would have made such embryos available for stem cell research. For even with the most aggressive harvesting of embryonic stem cells that scientists could possibly desire, the remaining supply of frozen embryos available for implantation would still greatly exceed any possible level of demand.)

Still, despite the foregoing dialectical to and fro, our general social acceptance of procedures of assisted conception that involve the creation of supernumerary embryos does pose a challenge to those who argue that hESC research is wrong because embryos have the same moral status that you and I have. For if embryos really did have this status, it seems that our acceptance of assisted conception, as currently practiced, would be misplaced—even if assisted conception does not require killing embryos and does not use them merely as means. For once an embryo exists, if it would be seriously wrong to kill it, it should also be seriously objectionable to allow it to die—or to freeze it, which, as I have argued, amounts to the same thing in virtually all cases. (For the sake of brevity, I will henceforth write as if freezing an embryo were tantamount to allowing it to die, despite the fact that freezing leaves open a remote possibility of a restoration to an active living state.) Of course, if there is a special objection to using an embryo merely as a means, and if the distinction between killing and letting die has significance in this sort of case, then there are significant reasons for thinking that assisted conception, as currently practiced, is *less* morally objectionable than hESC research—though these reasons may be offset to a considerable extent by the vastly greater importance of the goals of hESC research, which aims to prevent or cure a range of deadly and debilitating diseases, while assisted conception aims primarily to enable people to have children that are genetically their own rather than having to settle for adoption. But if we really believed that embryos have the same moral status that we—cognitively normal adult human beings—have, it seems unlikely that we would be morally comfortable treating them the way we do in assisted conception, creating conditions in which vast numbers of them have to be frozen and thus, ultimately, allowed to die.

It is difficult to test our intuitions by devising a thought experiment in which the freezers at fertility clinics are full not of many thousands of embryos but of many thousands of adult human persons, and in which more frozen persons are being added to the stocks as a byproduct of people's efforts to have their own biological offspring rather than adopting already existing children. For the situation of embryos frozen in the process of assisted conception is in important respects *sui generis*. In the case of the many thousands of embryos that are frozen, the only feasible alternative to their being in this state is for them never to have existed. It is, relative to this alternative, not worse for them to be in their frozen state. They have not, moreover, had experiences in the past that might make it seem more urgent to restore them to life, and they are not

specially related to other people in ways other than the purely biological. It is, for obvious reasons, difficult to formulate a science-fiction scenario in which parallel conditions apply to frozen adult persons.

I think, nevertheless, that we can learn something important from simply imagining discovering a vast number of frozen persons. Imagine, for example, a country with a despotic government that has for decades been sealed off from the rest of the world, in the way Cambodia was in the late 1970s. Over these decades many thousands of people, both real and imagined opponents of the regime, have been killed. For some reason, if any of these people had a single child between the ages of three and five, that child was cryogenically preserved in a state intermediate between life and death. The government has now been overthrown, and its secret laboratories have been opened to scrutiny. Many thousands of frozen children are discovered, though none has living parents, siblings, or friends. How much, if anything, ought strangers to sacrifice in order to restore these children to life? Suppose that the burden of restoring a child to life would be roughly comparable to the burden of pregnancy—for example, each child would have to be connected to the circulatory system of another person for nine months, as in Judith Jarvis Thomson's well-known "famous violinist" example (Thomson 1971). I think that many people would believe that we—all of us together—ought to try to devise ways to save these children that would divide the burdens equally among us. And I suspect that some people—*comparatively* few but in absolute terms a significant number—would feel it morally incumbent on themselves to volunteer to become connected to a child in order to save its life. This would be in sharp contrast to the conspicuous failure of even the most ardent "pro-life" activists to give frozen embryos a chance at life by offering the use of their bodies for fetal gestation.

The facts are that we as a society have accepted a practice of assisted conception that creates as a byproduct a vast and growing number of frozen embryos, yet very few if any of us are willing to make a significant sacrifice to restore any of them to life. We do not, as a society, demand the abolition of the practice, and our government does not restrict it in the way that it restricts hESC research; nor do we make any effort to enable the embryos we have created to live. Instead we freeze them in order to pass the burden of allowing them to die to others. The contrast between this behavior and our likely reaction to the hypothetical case of the frozen children suggests that, whatever people may profess on their bumper stickers, very few really believe that embryos have the same moral status as older children and adults. Some opponents of hESC research do, of course, extend their opposition to assisted conception as well, at least as it is currently practiced; but they seem to be a minority among the opponents of hESC research. For the majority, acceptance of assisted conception as practiced casts doubt on their commitment to the second of the two assumptions stated earlier.

3. Monozygotic Twinning

The first of our two assumptions—that we were once six-day-old embryos—is often challenged by appealing to the possibility of monozygotic twinning (that is, twinning that results from the division of a single embryo rather than from the simultaneous fertilization of more than one egg). Many people have argued that until the possibility of twinning has passed, at around two weeks after conception, the embryo cannot be a single or unique human being. As recently as 2004, for example, Alexander McCall Smith, a well-known novelist who is also a law professor, wrote:

At an early point in its development, the embryo can divide into twins or remain a single individual. This is important because one might say that before that stage has been reached, we do not have an identifiable individual. It is only when the embryo can no longer divide in this way that we can say that a distinct individual has come into existence, or started. We cannot therefore say that there is a separate person there, if we're going to use the language of personhood, because we do not know whether there is going to be a separate person or two persons. (McCall Smith 2004, disc 1, track 7)

Although this argument is common, especially among defenders of hESC research, I think it is mistaken. That an entity can undergo division is no reason to think it is not a unique individual. It is no reason to think that an ameba is not an individual ameba, that it can divide, or that any other cell is not a unique individual object because it can undergo fission. Yet even though the possibility of twinning does not show that the first of our assumptions is wrong, it does suggest that the two assumptions cannot both be true.

Suppose that when fertilization results in the existence of a single-celled human zygote, a new human being—one of us—thereby begins to exist. What the phenomenon of twinning shows is that some of us begin to exist at a different time and in a different way. Monozygotic twins, on this view, begin to exist not at conception but when an embryo divides.

Consider again the ameba. When an ameba divides, the original ameba ceases to exist and is replaced by two qualitatively identical daughter amebas. Similarly, when an embryo divides to form twins, if the division is symmetrical, the original embryo also *ceases to exist*. The original embryo cannot be identical with *both* twins, since one thing cannot be numerically identical with two things that are not identical with each other. And if the division is symmetrical, the original embryo cannot be one twin but not the other, for there is nothing about one twin to identify it as the original embryo that is not also true of the other.

Of course, when the division that leads to twinning is asymmetrical—as it might be if a single totipotent cell (that is, a cell with the potential to develop into a mature human organism) were extracted from an early embryo and allowed to develop into a twin—the original embryo would

survive. In that case, one twin would begin to exist at a different time and in a different way from the other.

But let us focus on cases in which the division is symmetrical, for these are the cases that challenge the idea that we were embryos. If the embryo is someone like you or me and if it matters in the way you and I do (the two assumptions), then when symmetrical twinning occurs and an embryo ceases to exist, this should be *tragic*. For it is the ceasing to exist of someone who matters. According to the two assumptions, therefore, there is a serious moral reason to try to prevent monozygotic twinning from occurring. Or at least we should try to ensure that all instances of twinning involve asymmetrical division, so that no one ceases to exist. But these suggestions are absurd, and I know of no one who believes either.

If the two assumptions stated in section 1 that seem to underlie most opposition to hESC research together imply both that accepted procedures for assisted conception are seriously objectionable and that monozygotic twinning is a terrible misfortune for an embryo and ought if possible to be prevented, then there is reason to believe that those assumptions cannot both be true. As I noted earlier, I believe that neither is; but I will devote most of my space here to showing that the first assumption—that we were once embryos—is indefensible.

4. Are Six-Day-Old Embryos Human Organisms?

Many people who believe that we were once embryos attempt to defend that view by claiming (1) that an embryo is a human organism in the earliest stage of its life and (2) that we are essentially human organisms. I believe, however, that the first of these claims is contentious and that the second is false. I will begin with the first. Although I do not think that it can be shown to be false that a six-day-old embryo is a human organism, I think that there is room for reasonable doubt about this. I will try to show what is at issue here.

There are two interpretations of what happens in the first fortnight after conception. The first treats the embryo as a human organism; the second does not. I will sketch them both and state the case for thinking that the second is more plausible.

According to the first interpretation, the successive cell divisions that follow the process of conception are events in the history of a single entity composed of various cells. This entity begins as one cell—the zygote—and continues to exist, as two cells, then four, and so on.

Yet it is unclear what makes all the various cells, considered synchronically or diachronically, parts of a single individual. They are all contiguous within a single extracellular membrane (the zona pellucida), but that alone does not make them a single entity any more than placing a number of marbles in a sack turns them into a single entity.

To consider whether the cells within the membrane of the early human embryo constitute a human organism, it is necessary to be clear about what a human organism is. I accept the familiar idea that a living human organism is an entity with human genes that is composed of various living parts that function together in an integrated way to sustain a single life, and that is not itself a part of another living biological entity.² (The last clause is necessary in order to exclude the implication that living human cells or organs are themselves human organisms.)

According to the second interpretation of the events in the first two weeks following conception, the cells that compose an embryo during this period do not yet serve sufficiently different functions to allow us to say that they are coordinated in the service of a single life. While each cell is itself alive, they are not together involved in processes that are constitutive of a further, higher-order life. During the first couple of weeks after conception, all that exists is a collection of qualitatively almost identical cells living within a single membrane. They are like marbles in a sack.

On this interpretation, the single-celled zygote is a single living entity, though not itself a human organism. When it divides, nothing but its constituent matter continues to exist. The zygote itself ceases to exist, as an ameba does when it divides, though in doing so it gives rise to two daughter cells. When they in turn divide, they too cease to exist. There is no individual that persists through these transformations. Only when there is sufficiently significant cell differentiation, so that different cells begin to serve different though coordinated functions that are identifiable as the regulative and self-preservative processes of a higher-order individual of which the cells are parts, do the cells together constitute a human organism. Only then is there a new and further life that is constituted by the integrated processes carried out by the various groups of differently functioning cells. Since significant cell differentiation is clearly identifiable at around two weeks after conception, it seems reasonable to treat that as the time at which a human organism begins to exist. For those who persist in thinking that a unique human individual cannot exist until after the possibility of twinning has passed, it is perhaps significant that the time at which significant cell differentiation begins to occur coincides rather closely with the time at which twinning ceases to be possible.

This second interpretation may be disputed on the ground that the cells that compose the embryo are coordinated very early on, certainly before

² This definition of a human organism implies that a zygote is not a human organism, even though it is genetically human and is an organism. The definition has this implication because it stipulates that at least some of a human organism's parts must be living, whereas the parts of a zygote are not thought to be separately alive. Those who believe that zygotes are human organisms could amend the definition by deleting the adjective "living."

six days after conception.³ There must, after all, be communication and coordination among them prior to significant differentiation, if only in order to ensure that different cell lines develop in different directions. Embryonic development would not get very far if all the cells decided, all at once, to specialize as skin cells.

This forceful objection helps to reveal what I think is fundamentally at issue in the dispute between proponents of these two different interpretations of what happens during the first two weeks after conception. Cellular specialization and intercellular coordination are matters of degree. Whether the cells within the zona pellucida constitute a human organism depends on whether they are differentiated and coordinated to a high enough degree to warrant the claim that their interactions constitute a higher-order life. But there is no objectively determinate degree of differentiation and coordination that is necessary and sufficient for the presence of a higher-order life. When we know all the facts about the various cells within the zona pellucida and their functions, we know all the basic facts there are to know. While there is no doubt a threshold along the spectrum of degrees of coordination beyond which it is undeniable that a collection of cells are functioning together to sustain a higher-order life, there may be, prior to that threshold, no objective fact about whether the cells together constitute an organism. Whether there is a human organism present may simply be underdetermined by the facts.

The question of when the level of differentiation and coordination becomes sufficient for the presence of a human organism is not a biological or scientific question but a metaphysical question. How we ought to answer it is a matter of overall coherence among our beliefs and concepts. Our answer should, for example, cohere with our beliefs about the end of life. If the minimal degree of cellular coordination that is present only a day or so after conception is sufficient for the existence of a living human organism, then it seems that we ought not to believe that brain death is the biological death of a human organism. For brain death is compatible with residual functioning among cells, tissues, and even organs that is far more extensive and highly coordinated than that found among the cells in a two-day-old or six-day-old embryo. Indeed, the level of coordination among the still-living parts of a brain-dead human organism that is given certain minimal forms of external support (such as mechanical ventilation) is immeasurably higher than that found among the cells in an early embryo, which is also dependent on life support from the maternal body. Thus, even most of those who reject brain death as the

³ Am I much indebted to Alphonso Gómez-Lobo for pressing me on this, and for providing me with evidence of various forms and degrees of intercellular coordination that are manifest shortly after fertilization. He has persuaded me that, at a minimum, I should be more agnostic about the time at which a human organism begins to exist than I was in McMahan 2002, in which I argued for the second of the two interpretations discussed here.

criterion of the biological death of a human organism, and embrace instead a criterion that is directly concerned with internally regulated integration among the organism's parts, would regard a once-living human organism as dead if it had no more coordination among its still-living parts than is present among the cells in a six-day-old embryo. This is one coherence-based reason for denying that such an embryo is a living human organism rather than a collection of cells that are each inner-directed along a path toward the formation of an organism.

Still, it may be best at this point to regard the question of when a human organism begins to exist as an open question. There is a strong case for the view that after about two weeks following conception there is sufficient differentiation and coordination among the cells in the zona pellucida to claim that together they constitute a higher-order life, the life of an organism. It is possible that before that point there is sufficient coordination to warrant the claim that the cells already constitute an organism. The best answer may well depend on facts about the cells and their relations with one another of which we are as yet unaware.

5. We Are Not Human Organisms

No doubt it is odd to suppose that whether you existed at six days after conception depends on the degree to which a set of embryonic cells were coordinated with one another. Many people will be dismissive of that idea and will accept as sturdy common sense that a human organism begins to exist at conception. Suppose this is right and two-day-old and six-day-old embryos are human organisms. Still, it follows that *we* were embryos only if we are essentially human organisms. I will argue that we are not.

Whether we are organisms is not a scientific question. There is no experiment that can be done to determine whether or not we are organisms, just as there is no experiment that could tell us whether a statue and the lump of bronze of which it is composed are one and the same thing or distinct substances. These are both metaphysical questions and must be settled by philosophical argument.

There are two arguments that I believe show that we cannot be human organisms. I will rehearse them only briefly here, as I have presented and developed each in more detail elsewhere (McMahan 2002, 31–39). The first appeals to a thought experiment, long familiar to students of philosophy, involving brain transplantation. (The thought experiment is actually more convincing if it involves transplantation only of the cerebrum and not of the entire brain. But for simplicity of exposition I will follow tradition and make it the entire brain.) Suppose that you and your identical twin are both involved in a terrible accident. Your brain is undamaged, but the rest of your body is so badly injured as to be moribund. Your identical twin's brain has been destroyed, but the rest of his or her body is undamaged. Exploiting new techniques that enable the

proper neural connections to be made between your brain and your twin's body, your surgeons remove your twin's dead brain and transplant your perfectly functional brain in its place. Most of us believe that the person who then wakes up in that body is you. But if you were a human organism, you would now be the dead organism from which your brain was extracted, and the person who wakes up after the surgery would be your twin, now nicely equipped with a new brain.

Some people object to this argument because it depends on an example that is purely hypothetical. They think that we ought not to trust our intuitions about unrealistic cases. My second argument is not vulnerable to this objection, as it appeals to an actual phenomenon: dicephalus. Dicephalic twinning is a radically incomplete form of conjoined twinning in which two heads, each with its own brain and its own separate mental life, sit atop a single body. In some cases, there is very little duplication of organs below the neck; there is one circulatory system, one metabolic system, one reproductive system, and one immune system. In these cases, there are two persons but only one human organism. The two twins cannot both be the organism, because that would imply that they are not distinct individuals but one and the same person. Each twin's relation to the organism is the same; therefore there can be no reason to suppose that one of them is the organism while the other is not. It seems, therefore, that *neither* of them is identical with the organism. If dicephalic twins are essentially the same kind of thing that we are, then we are not organisms either.

But even if dicephalic twins were asymmetrically related to the organism as a whole, so that one twin had a much stronger claim to *be* the organism than the other, that could be sufficient to show that the other twin was clearly *not* the organism. But in that case there would be at least one person who was not identical to an organism. Unless that twin were essentially a different kind of entity from the rest of us, it would follow that we are not essentially organisms either.

There are in fact cases of highly asymmetric conjoined twins. In the phenomenon known as "craniopagus parasiticus," one conjoined twin is fully developed but the other, which is joined to the first at the head, has failed to develop a body and is thus, as the name suggests, a second head that draws life support from an organism to which it is attached but over which it exercises no control. There are only eleven recorded cases of this phenomenon, but two have occurred in the twenty-first century. In one case in Egypt, the second head was surgically removed, but the remaining twin died a little more than a year later from an infection of the brain. A BBC report comments that the "second head could smile and blink," but "whether it was capable of independent thought is unclear."⁴ Whatever

⁴ See <http://news.bbc.co.uk/2/hi/health/4285235.stm> and <http://news.bbc.co.uk/1/hi/world/4848164.stm> (both last accessed on 22 October 2006).

was true in this actual case, it seems possible that there could be a case in which the brain in the parasitic head would be fully developed and separate, thus forming a separate center of self-conscious, rational thought.

That this is possible is suggested by the series of experiments by Robert J. White in which various animals' heads were kept alive and fully conscious after being severed from the body, and by cases of high spinal cord transection. In such cases, the brain remains fully conscious if supplied with oxygenated blood even though it is otherwise actually or effectively unconnected with an organism. If there were a case of *craniopagus parasiticus* in which the parasitic head contained a fully developed brain, this would be a clear instance of a single organism supporting the existence of two distinct persons. Even if we were to claim that the person whose brain controlled the organism was identical with that organism, the person resident in the second head could not plausibly be identified with any organism. This again supports the view that individuals of the sort that you and I are cannot be essentially human organisms.

It might be objected to this argument that just as one of White's severed heads is itself a human organism shorn of most of its nonessential parts, so the parasitic head in *craniopagus parasiticus* is also a distinct organism. But both these claims are false. A severed but living head with an external blood supply is not an organism but a surviving part, rather like an organ salvaged from a now-dead organism and kept alive pending transplantation. Similarly, a parasitic head is no more an organism than my head is.

If, however, we are not human organisms, then even if a human organism begins to exist at conception, it does not follow that we began to exist at that point. If you are not identical with the organism that supports your existence, it is possible that you began to exist in association with it at some point after it began to exist, whether that was at conception or a couple of weeks later.

6. We Are Not Souls

Most Americans actually reject—if not consciously, then at least by implication—the view that we are essentially human organisms. They believe that we are something rather more exalted and spiritual than that. They believe that we are souls, or at least that each of us is an organism that is essentially informed by a soul. If, as most believe, the soul is created at conception, then embryos are souls in miniature. One of us—that is, an entity of our essential kind—is present from conception on, and this is entirely independent of what his or her cells might be doing.

The idea that we are souls faces an embarrassing array of questions to which it is difficult to provide answers that are supported by reasons and argument rather than mere conjecture. What is the nature of the soul?

What reason is there to suppose that the soul, so conceived, exists? Do nonhuman animals have souls as well, and if not how can one detect the presence of the soul in an embryo while being confident of its absence in a dog? Assuming that souls do not come in degrees, so that the possession of a soul is all-or-nothing, when in the course of evolution did our ancestors begin to be endowed with souls? Was there a detectable difference between the parent that lacked a soul and the child who had one? If the soul can survive the death of the human organism and retain its full psychological capacities in a disembodied state, why are one's psychological capacities or states affected at all by what happens to one's brain? What happens to the soul of an embryo that divides and is replaced by two new embryos? What happens to the soul when the tissues connecting a person's cerebral hemispheres are surgically severed, creating two separate centers of consciousness, each capable of experiences inaccessible to the other?

There is no space to press these questions here. I will instead describe the two most common and well-articulated conceptions of the soul in the history of western thought and suggest that neither is compatible with the view that the soul is present at six days after conception.

The less familiar of these two conceptions among contemporary people is the conception associated with the Catholic Church, according to which a human being is a human organism informed by a rational soul. The soul is, it is said, the form of the body, and the rational soul, which distinguishes human beings from animals, is the way in which the matter of the organism is organized so that it has the capacity for rationality. Hence the tendency among Catholic theorists to refer to the soul as the "organizing principle."

The obvious problem for this view is that a six-day-old embryo does not seem to have the capacity for rationality. Its matter is not organized that way. Partly for this reason, some writers in the Catholic tradition have argued for the view known as "delayed hominization," according to which the early embryo is not a human being, which it develops into only later in pregnancy. Some contemporary Catholic philosophers have argued, however, that the early embryo does indeed have the "basic natural capacity" for rationality, though that capacity does not become "immediately exercisable" until later (George and Gómez-Lobo 2002, 260–61). What this really amounts to, I think, is the familiar claim that a normal embryo has the potential to develop the capacity for rationality, with special emphasis on the claim that the embryo's potential involves an intrinsic inner-directedness toward the development of rationality. But even if all embryos have this inner-directed or intrinsic potential, that seems insufficient for the truth of the claim that their constituent matter is organized in such a way as to have the capacity for rationality, which is what the Aristotelian-Thomist conception of form requires in order for them to have rational souls. Nor do I think it is true that all human

embryos are inner-directed toward the development of rationality. I will not pursue these issues here, though I discuss some of them at length elsewhere (McMahan forthcoming).

The soul as understood in Catholic doctrine is really neither physical nor nonphysical. It is not a thing at all but is instead the form or organizing principle of the body. Most people, however, believe that the soul is a substance, that it is nonphysical, that it is the subject of consciousness, and that it can continue to exist and remain actively conscious in the absence of a body—which explains how we can survive in a disembodied state after death.

Because the soul, on this conception, is nonphysical, it is hard to make sense of its existing in the absence of mental properties. For this reason, Descartes, who developed this conception of the soul with greater rigor and detail than anyone else, thought that the soul must be continuously conscious. Consciousness is its defining property. If there is no consciousness—or even, to be more liberal than Descartes would allow, any capacity for consciousness—there can be no soul. But very few people, if any, seriously believe that a six-day-old embryo is conscious. If this is right and a six-day-old embryo has neither consciousness nor even the capacity for consciousness, then the soul cannot be present at that point; therefore, if we are Cartesian souls, we cannot have been present at that point; therefore we were never six-day-old embryos.

To make sense of the idea that we existed as early embryos, one has to accept that we are essentially either human organisms or souls and that the early embryo either is a human organism or has a soul. There really is no other kind of thing that we could be that is present only a few days after conception. I have argued, however, that the early embryo may not be a human organism at all, and that in any case we are not essentially human organisms. And I have argued that even if we are, or have, souls, the two dominant conceptions of the soul, together with the facts about the nature of the embryo, exclude the possibility that the soul is present in the early embryo. I also believe, though I have not argued for this here, that there is no reason to suppose that souls of any sort exist. I think, therefore, that it is a mistake to think that we were ever early embryos. In other words, the first of the two assumptions stated in section 1 is false.

If we were never early embryos, the main reason for thinking that it is seriously wrong to kill or otherwise use early embryos for hESC research collapses. To kill an early embryo is not to kill someone like you or me. It is to prevent one of us from coming into existence.

7. When We Begin to Exist

If we are neither human organisms nor souls, what kind of thing are we essentially, and when do things of our sort begin to exist? What I believe to be the best answer may emerge if you imagine yourself in the very early

stages of progressive dementia. How long will you survive? You will be there as long as long as your brain continues to generate consciousness, and indeed as long as your brain retains the capacity to generate consciousness. As long as there is a subject of experiences present, or if it is possible to revive a subject of experiences in your body, then *someone* is present, and who might that be if not you?

But what if your brain altogether and irreversibly loses the capacity for consciousness? What remains? Suppose the organism that many people take to be you remains alive. If I am right that you are not and never were an organism, then that living organism cannot be you. It is hard to identify anything else that might be you. I think we should conclude that you ceased to exist along with the capacity for consciousness. That suggests that you are essentially an entity with the capacity for consciousness—a mind.

A human organism is conscious only by virtue of having a conscious part. We are that part. We are that which is nonderivatively the subject of consciousness. The label I use to describe what we essentially are is “embodied mind.”

We coexist with our organisms throughout our lives, but our organisms begin to exist and are alive before we arrive on the scene, and they usually survive us, sometimes even remaining alive after we have ceased to be, as occurs, in my view, in persistent vegetative state. We begin to exist when the fetal brain develops the capacity for consciousness, which happens sometime between twenty-two and twenty-eight weeks after conception, when synapses develop among the neurons in the cerebral cortex. Only after the development of the capacity for consciousness is there anyone who can be harmed, or wronged, by being killed.

8. Potential

Even if I am right that we were never six-day-old embryos and that the main objection to killing embryos has no force, there remain two possible reasons for thinking that killing early embryos is wrong. Neither offers as strong an objection to killing early embryos as there would be if to kill an embryo were to kill someone whose moral status was the same as yours and mine. But each supports an objection serious enough to be worthy of discussion.

One appeals to potential. Unlike the Catholic view discussed in section 6, according to which the intrinsic potential for rationality *makes* an embryo a human being, this argument concedes that the embryo is not the same kind of thing that you and I are but claims that it has the potential to become one of us, and that this makes it a kind of thing that it is seriously wrong to kill, or to use as a mere means.

Although I claim that we are essentially embodied minds and are only contingently persons (that is, beings with psychological capacities of a

certain level of complexity and sophistication), I also think that at those times when we are persons our moral status is conspicuously high. Some of those who object to the killing of embryos do so on the ground that although embryos are not persons, they have the potential to become persons. The problem with this suggestion, however, is that the sense in which embryos have the potential to become persons is not the sense in which potential might be a basis of moral status.

A little more than fifty years ago there existed a sperm and egg pair from which I eventually developed. We say that that pair of cells had the potential to become me; yet I never existed as those two things. I am one thing and cannot ever have been identical with each of two distinct entities. The potential that the sperm and egg together possessed was merely the potential to give rise to the later existence of an entity—me—to which neither would be identical. That kind of potential is not a basis for a high, intrinsic moral status. Neither that sperm nor that egg would have been wronged by being killed. It would have been permissible to kill either or both, or to use either as a mere means.

The potential of an early embryo is like that: it is not the potential to *be* a person, in the sense that presupposes that the embryo would be one and the same thing as the later person. It is, rather, only the potential to give rise to the existence of a person who would be an individual numerically distinct from the embryo. An early embryo's potential, therefore, provides no more reason not to kill the embryo than there is not to kill any particular sperm and egg pair. (This is true unless we identify a different way in which the potential might be valuable. If the potential were valuable not as a basis of moral status but because it was important to have more persons in the world, then the value of the embryo's potential might be greater than that of a sperm and egg pair because the embryo's potential would have a higher probability of being realized.)

9. Intrinsic Value

Some philosophers argue that even if early human embryos do not have the same moral status that you and I have, they nevertheless have a special sort of value. They may not have interests or rights or be worthy of the sort of respect that is owed to rational beings, but they have a certain sanctity that prohibits our treating them in certain ways (Dworkin 1993; Steinbock 2006).

It is difficult to demonstrate that such a claim is false, though it is also difficult to explain on what basis, other than its potential, an early human embryo could have a special value that an animal, or even an animal embryo, lacks. But let us assume, for the sake of argument, that an early embryo does indeed have a special sort of value or sanctity. Just how important a value is this?

If we consider the social practices of our society, it is hard to avoid the conclusion that few people really think that early embryos have significant intrinsic value. As I noted earlier, even most of those who oppose the killing of embryos for hESC research tend not to protest strenuously at the inevitability of eventually killing the many thousands of embryos created and frozen as a byproduct of the practice of assisted conception, or allowing them to die. And even those who oppose assisted conception on the ground that it creates embryos that must eventually be killed, or be allowed to die, do not campaign for research on ways of preventing the vast number of deaths among early embryos that are occurring all the time all over the world through spontaneous abortion. Approximately two-thirds of all human embryos conceived die naturally before birth, and a high proportion of these deaths occur prior to implantation—that is, within the first couple of weeks after conception. If early embryos had significant intrinsic value, there would surely be serious reason to attempt to prevent these many deaths. But even the most vocal champions of early embryos have so far evinced little concern.

I think, therefore, that appeals to the early embryo's potential or to its intrinsic value support only a feeble case against the killing of embryos if it is true, as I have argued, that we were never early embryos. The conclusion I draw is that there is no serious moral objection to killing an early embryo. To kill an early embryo is morally comparable to killing both a sperm and an egg that would otherwise have fused to form a zygote. Indeed, on this view, there is not even any significant moral reason to prefer the new technique for acquiring hESCs that allows the embryo to live to the older technique that involves killing the embryo at five or six days.

Department of Philosophy
Rutgers University
26 Nichol Avenue
New Brunswick, NJ 08901-882
USA
McMahan@Philosophy.Rutgers.edu

Acknowledgments

I am very grateful for comments on this essay to Laura Grabel, Lori Gruen, and, especially, Alfonso Gómez-Lobo.

References

- Dworkin, Ronald. 1993. *Life's Dominion*. New York: Knopf.
 George, Robert P., and Alfonso Gómez-Lobo. 2002. "Statement of Professor George (Joined by Dr. Gómez-Lobo)." In *Human Cloning*

- and Human Dignity: An Ethical Inquiry*, report by the President's Council on Bioethics, 258–66, available at http://www.bioethics.gov/topics/cloning_index.html (last accessed on 22 October 2006).
- McCall Smith, Alexander. 2004. *Creating Humans: Ethical Questions Where Reproduction and Science Collide*. Prince Frederick, Md.: Recorded Books.
- McMahan, Jeff. 2002. *The Ethics of Killing: Problems at the Margins of Life*. New York: Oxford University Press.
- . Forthcoming. “Challenges to Human Equality.” *Journal of Ethics*.
- Steinbock, Bonnie. 2006. “The Morality of Killing Human Embryos.” *Journal of Law, Medicine, and Ethics* 34, no. 1 (Spring): 26–34.
- Thomson, Judith Jarvis. 1971. “A Defense of Abortion.” *Philosophy and Public Affairs* 1, no. 1 (Fall): 47–66.