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Saviour embryos? Preimplantation genetic diagnosis as a therapeutic technology

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Abstract The creation of 'saviour siblings' is one of the most controversial uses of preimplantation genetic diagnosis (PGD). This paper outlines and invites ethical discussion of an extension of this technology, namely, the creation of 'saviour embryos' to serve as a source of stem cells to be used in potentially life-saving therapy for an existing child. A number of analogies between this hypothetical use of PGD and existing uses of IVF are offered and, in addition, between saviour embryos and proposed therapeutic applications of stem cell technology. The ethical significance of a number of disanalogies between these cases are explored and investigated. While the creation of saviour embryos would involve a significant shift in the rationale for IVF and PGD, it is suggested here that the urgent need of an existing individual should be prioritised over any obligations that might exist in relation to the creation or destruction of human embryos. 

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Introduction

The creation of 'saviour siblings' is one of the most controversial uses of preimplantation genetic diagnosis (PGD). In rare circumstances, the only way to save the life of a child may be to use PGD to facilitate the birth of another child who can serve as a donor of matching tissue (Kuliev et al., 2005; Samuel et al., 2008; Verlinsky et al., 2007). In rarer circumstances still, the parents of a child suffering from a life-threatening illness and requiring a donation of a rare

tissue type may be capable of producing embryos but not of bringing a child to term. As a result, such couples do not have the option of creating a saviour sibling. However, recent advances in our knowledge of stem cells and understanding of processes of cellular differentiation have opened up the possibility of deriving specific cell types from embryonic stem cells (Bhatia, 2007; Murry and Keller, 2008; Ng et al., 2005). If the couple could conceive and identify an embryo with the appropriate tissue type using IVF and PGD, it might then be possible to extract stem cells from that

embryo and then differentiate them into the cells required for transplant into their existing child in order to save his or her life. This scenario might be thought of as involving the creation of 'saviour embryos'.

Because the creation of saviour embryos would involve the deliberate creation of embryos with the intent to destroy them, it is likely to prove extremely controversial. However, it is also likely to be a life-saving technology for young children in some circumstances and, as such, is clearly worthy of serious discussion. This paper invites comment and discussion from medical ethicists in order to guide future thinking and practice in relation to this proposal. To facilitate this discussion, a number of analogies between this hypothetical use of PGD and existing uses of IVF are offered and also between saviour embryos and proposed therapeutic applications of stem cell technology. The ethical significance of a number of disanalogies between these cases are also explored and investigated. While the creation of saviour embryos would involve a significant shift in the rationale for PGD, it is suggested here that the urgent need of an existing individual should be prioritised over any obligations that might exist in relation to the creation or destruction of human embryos.

The case for saviour embryos

There are a number of diseases affecting children, including Fanconi anaemia, beta thalassaemia, sickle cell disease and some immunodeficiencies, where the only treatment that will save the life of the child involves a transplant of tissue from a human leukocyte antigen (HLA)-compatible donor (Lucarelli et al., 2002; Verlinsky et al., 2001, 2007). In cases where it has proved impossible to locate a suitable donor, some parents have chosen to conceive another child in the hope that this child – a so-called 'saviour sibling' – will be able to serve as a tissue donor to save the life of the existing child (McBride, 1990; Robertson et al., 2002). More recently, PGD has been employed to ensure that the child that will be born will be capable of serving as a source of matched tissue (Kuliev et al., 2005; Samuel et al., 2008; Verlinsky et al., 2001, 2007).

If the parents of a terminally ill child are unable to find a suitable donor and are also unable to have another child due to the woman's inability to carry another child to term, currently their only hope of saving the life of their child would be to try to secure the services of a surrogate mother to bear a child conceived of their gametes, which then might serve as a saviour sibling. This may prove extremely difficult: in some jurisdictions surrogacy may not be legal; even where surrogacy is legal, the parents may not be able to find a willing surrogate. However, recent advances in stem cell science suggest another possibility. It seems likely that, in the not-too-distant future, it will be possible to derive specific tissues from embryonic stem cells and then use these for therapies, including transplants of the sort necessary to save the lives of children in the situation described above (Daley and Scadden, 2008; Lerou and Daley, 2005; Murry and Keller, 2008). Should this become the case, then parents might conceive a number of embryos using IVF and screen them for HLA-compatibility with the existing child using PGD. Stem cells from a compatible embryo might then be

used to derive tissue for transplant to save the life of their existing child. The embryos created – and destroyed – in this process would be 'saviour embryos'.

The need for saviour embryos may lapse if it proves possible to derive suitable tissue for the appropriate transplants from embryos created using somatic cell nuclear transfer (SCNT) of DNA from a person who was HLA-compatible with the child requiring a transplant (Elsner, 2006; Vanikar et al., 2007) or from 'induced pluripotent stem (IPS) cells' created from such a person (Baker, 2007; Takahashi et al., 2007; Yu et al., 2007). The latter technology would clearly be preferable, if it becomes available, as it would avoid the creation of a human embryo (some ethical concerns about SCNT cloning are discussed below). However, both these alternative solutions to the problem faced by parents of children requiring tissue-matched stem cell transplants are (also) hypothetical. It may be that the challenges involved in developing a procedure to clone and reliably derive stem cells from human blastocysts (Hall et al., 2006) or in demonstrating the safety of transplants from tissues derived from IPS cells (Daley and Scadden, 2008; Zhao and Daley, 2008) means that these alternatives will not become available for some years after the date at which it becomes possible to safely transplant tissue derived from embryonic stem cells. For some period at least, then, it may be that the creation of saviour embryos would be the only way to save particular human lives.

Because the circumstances described above will be rare, the proportion of those people requiring an HLA-compatible transplant who could only be saved by the creation of a saviour embryo is likely to be small. However, the number of people affected by diseases that are best treated by a transplant from an HLA-compatible donor is large, with over 330,000 affected children being born each year, according to some estimates (Modell and Darlison, 2008). There are therefore a significant number of patients who could benefit as a result of the creation of saviour embryos. Moreover, every life is precious and in cases of the sort described above, children will die unless their parents are allowed – and assisted – to create saviour embryos. There is thus a compelling prima-facie case for the creation of saviour embryos in at least some circumstances. This case is established by the moral weight of the urgent medical need of a living individual and the desperate desire of parents to save the life of their child.

The most obvious objections to the proposal presented here arise out of a concern for whatever moral respect is due to the embryos that would be destroyed during the course of this procedure. Obviously, it is not possible to settle the vexed question of the moral status of human embryos in this context. However, it is worth emphasizing the burden of the argument required to establish that the embryos that would be destroyed in this procedure are worthy of a moral respect sufficient to render the procedure unethical.

At the time at which stem cells would be removed from the embryo, the embryo consists of a ball of 80–100 cells. It has no nerve cells, is incapable of experiencing any sensation, and has no desires; thus destroying it will not cause it any suffering or frustrate any preferences (Singer, 1999; Tooley, 1999). If implanted into a woman's womb, the embryo might develop into a child, but equally well it might

not, as many embryos which succeed in implanting do not go to term. The moral significance of any potential the embryo does have is unclear. As John Harris (Harris, 1998) has pointed out, all living human beings are potential corpses but that doesn't mean that living persons should be treated as though they were dead. Moreover, because of the possibility that these early-stage embryos may undergo spontaneous fission up until 14 days, it cannot even be said that they represent the beginning of a human life: they equally well might represent the beginning of two or more lives (Harris, 1998).

It is true that even such early-stage embryos do represent the beginning of human life (if not necessarily one single human life) and are consequently an important 'symbol' of a human life (Dworkin, 1993; Robertson, 1995; Steinbock, 2003). In other circumstances, such embryos are the focus of their parents' hopes and dreams and are treated as objects of great value. For these and other reasons, human embryos should be treated with a degree of respect that is not required in the treatment of other human cells or animal embryos (Steinbock, 2003). It is far from clear, however, that such respect is incompatible with the destruction of embryos if the reasons for the destruction are sufficiently morally weighty (Robertson, 1995; Steinbock, 2003). The urgent need to save the life of a sick child would seem to be just such a morally weighty reason.

Of course, there is a significant constituency amongst those involved in bioethical debate that will find these arguments about the (lack of) moral status of early-stage human embryos unconvincing. It may prove that no amount of philosophical argument will be sufficient to convince those who believe that embryos have the same moral status as innocent adult human beings that the destruction of embryos is ever warranted, especially where this conviction is founded on the authority of religious texts (Congregation for the Doctrine of the Faith, 1987). However, as shall be demonstrated below, those who are prepared to contemplate the destruction of embryos in any circumstances at all may be invited to consider the relationship between those circumstances and the technology proposed here. In this way it may be possible to make some progress in relation to the ethics of saviour embryos without needing to resolve more fundamental differences in opinion about the moral status of embryos.

Analogies?

While, at first sight, what is proposed here may seem to involve a radical extension of existing medical practice, careful consideration of a number of analogies with medical practices that are widely, if not universally, accepted suggests that the creation of saviour embryos may raise fewer ethical dilemmas than first appears.

Natural conception

Perhaps surprisingly, one of the most compelling analogies between this proposal and existing reproductive practice is the analogy with natural conception. If any reproductive practice is ethical, then presumably reproduction as a result of natural conception, pregnancy, and birth is ethical. Yet natural conception does not guarantee that those embryos

that are conceived will come to term. A significant percentage of embryos, up to 33% according to some authorities, will be spontaneously aborted before pregnancy or at some stage of the pregnancy (Modvig et al., 1990). A willingness to conceive naturally therefore requires that the couple be prepared to sacrifice those embryos that may be spontaneously aborted in the course of the attempt to become pregnant for the sake of the life of the child that is eventually born (Harris, 2006, 2007).

In fact, even this description exaggerates the moral weight of the justification for the destruction of embryos that occurs naturally. While, in those circumstances in which a pregnancy is planned, the parents intend the birth of a child, they are unable to justify this with reference to the child's benefit: as the child does not exist at the time at which this decision is made, the child may neither be harmed nor benefitted. Instead, parents' reasons for wanting a child necessarily refer to the desires of existing persons, to have a family, to experience the joys of parenthood, to express their love for each other, or to provide a companion for an existing child. While these may be admirable desires, they do not seem to have as much weight as the desire to save the life of an existing child. Moreover, of course, many pregnancies are not planned and result instead from contraceptive accident, risk taking, passion, intoxication, or ignorance. In such cases, embryos are created and consequently often destroyed (when they fail to implant or miscarriage occurs) for reasons which are at best morally trivial and are often reprehensible.

Both natural conception and the creation of saviour embryos require a willingness to sacrifice embryos to serve the desires of existing persons. The reasons for the creation and destruction of saviour embryos are *prima facie* more morally compelling than the reasons for the creation and destruction of embryos in natural conception. As natural conception is – presumably – ethical, this suggests that the creation of saviour embryos would also be ethical. Of course, the pursuit of natural conception only requires a willingness to risk the destruction of embryos whereas the destruction of embryos is required by the application of saviour embryos. However, the risk of the destruction of embryos that is involved in natural conception is converted into a virtual certainty in another reproductive technology – in-vitro fertilization.

In-vitro fertilization

Because of the costs, discomforts, and risks involved in each cycle of IVF and because the rate of successful pregnancies per embryo conceived is still low, IVF laboratories will usually create multiple embryos. These embryos will then be screened according to the IVF technician's estimation of how likely they are to lead to a successful pregnancy, with the 'best' embryos first to be implanted into the womb of the woman who wants to become a mother. Once a pregnancy is secured, the remaining embryos will normally be discarded.

IVF therefore requires a willingness to create multiple embryos knowing that most of them will not be implanted and will eventually be destroyed (Devolder, 2005a; Harris, 2006; Shannon and Cahill, 1988; Singer and Wells, 1984). Moreover, while the screening involved in IVF is usually

thought of as 'screening in' for implantation, it might equally well be thought of as 'screening out' embryos that are thereby unlikely to be implanted. These embryos are thus effectively 'selected for destruction' for the sake of securing a pregnancy leading to the birth of a(nother) child. This process arguably further instrumentalizes the embryos that are destroyed in the process (Shannon and Cahill, 1988). Finally, it is also the case in IVF that, after a pregnancy has been secured, it can be said that each embryo that was not implanted was created for the sake of another child.

Like the creation of saviour embryos, IVF involves the destruction of embryos, the selection of embryos for destruction, and the creation of embryos in the knowledge that they are likely to be destroyed. IVF is dedicated to bringing a child into the world, whereas the proposal under discussion would be aimed at saving the life of an existing child. If IVF fails, the desires of the parents are frustrated but no other individual is harmed; on the other hand, without the creation of a saviour embryo, a child will die. Again, the justification for the way embryos are treated in the creation of saviour embryos seems significantly greater than that for the same treatment in IVF.

However, it remains true of each individual embryo that is created in IVF, that it is created with the intention of bringing a child into the world (FitzPatrick, 2003). This is not true of this paper's proposal, which involves creating human embryos with no intention of allowing them the opportunity to flourish. Another technology that would also involve the creation of embryos for a purpose which requires their destruction, therapeutic cloning, is discussed below. First, however, a number of other reproductive technologies that have elements in common with this paper's proposal are explored.

Preimplantation genetic diagnosis

Preimplantation genetic diagnosis extends the screening involved in ordinary IVF to the genetics of the embryos created in order to increase the chances that a child will be born healthy. Again, PGD will typically involve screening out undesirable embryos rather than screening in desirable embryos – although this distinction is not always clear given that screening out undesirable traits will also be screening in desirable traits (Silver, 1999). PGD will also involve the destruction of those embryos that are not selected for implantation. Whereas the creation of surplus embryos might be said to be an unintended consequence of IVF, brought about by the low rates of implantation of embryos, the creation of multiple embryos, most of which will subsequently be destroyed, is an essential part of PGD, which aims to select one embryo from amongst many. Moreover, when the procedure is initiated there is the intention that particular (sorts of) embryos, if detected, will not be implanted and will therefore be destroyed. It is this feature of PGD that has been singled out for criticism by some activists within the disability community on the grounds that PGD necessarily involves the belief that it would be better if disabled people did not exist (Asch, 1988, 2000; Kaplan, 1993; Saxton, 1998; Wendell, 1996).

If PGD is ethical then presumably not only the destruction of embryos but also the creation of 'excess' embryos,

and the selection of embryos for destruction are ethical, and thus the presence of these elements in the creation of saviour embryos should not rule it out. Nonetheless, like IVF, PGD only involves the destruction of embryos as a foreseen but unintended consequence of the pursuit of a healthy baby. The procedure under investigation would require the destruction of an embryo and, as such, this would be an intended consequence of the procedure. However, the widespread availability of another reproductive technology – abortion – suggests that such destruction may sometimes be ethical.

Abortion

Abortion is legally available in many polities and widely practiced even in those polities where it is not legal. It is difficult to see how those who accept the moral permissibility of abortion in any circumstances could object to the destruction of embryos involved in the production of saviour embryos. Insofar as abortion would usually be procured for a reason, the embryo might be said to be destroyed for the sake of this reason. Yet the reasons for abortion usually fall well short of the need to save the life of an existing child that might justify the creation of saviour embryos.

Unfortunately, in the context of debates around the proper treatment of human embryos, abortion is likely to be just as controversial as the creation of saviour embryos and so arguments by analogy from the moral permissibility of abortion will have limited traction when it comes to convincing critics of the destruction of embryos involved in making saviour embryos that such destruction is warranted. However, the analogy with abortion is worth mentioning because a significant percentage of persons do believe that abortion may sometimes be justified and thus that the destruction of embryos may sometimes be justified. If the destruction of embryos is ever justified, it seems it would be justified in the scenario envisioned here.

Of course, the justification (or otherwise) of abortion is only relevant to the ethics of the destruction of embryos, whereas the procedure imagined here would also involve the creation of embryos for the sake of saving the life of another child. The next analogy to explore therefore is the analogy with saviour siblings.

Saviour siblings

The creation of saviour siblings has been the topic of extensive ethical debate, with a number of authorities concluding that it is in fact ethical (Damewood, 2001; Devolder, 2005b; Fost, 2004; Ram, 2006; Robertson et al., 2002; Sheldon and Wilkinson, 2004). It is also legally permissible in a number of jurisdictions (Ram, 2006; Spriggs and Savulescu, 2002). The main difference between the creation of saviour embryos and the creation of saviour siblings is that the latter involves the creation of a human child and not just of an embryo. After an embryo with an appropriate tissue type has been selected using PGD, this embryo is then implanted into the womb of a woman with the intention of extracting some of the child's tissues (usually bone marrow or umbilical cord blood) for the purpose of transplant into a terminally ill child (Verlinsky et al., 2001). Early examples of the pursuit of a matching tissue donor were relying on brute luck to

ensure that the child born could serve as a donor for an existing child (Ram, 2006) but the use of PGD maximizes the chance that the child born will be an appropriate source of tissue and minimizes the chances that multiple children might need to be brought into the world in order to achieve this result. Because the creation of a saviour sibling will usually require the creation of multiple embryos for the sake of PGD, it will also involve the destruction of embryos and the creation of embryos knowing that most of them will be destroyed.

However, in contrast with the hypothetical creation of saviour embryos, all of the embryos created in the process of creating a saviour sibling are conceived with the intention of bringing a child into the world. Of course, this is not the only intention involved in the creation of saviour siblings, as the procedure is initiated with the intention of thereby saving the life of the already existing child. The presence of this 'other' intention has led critics of this procedure to argue that it involves 'instrumentalizing' the child that is created by bringing it into existence as a means to the end of saving another child's life (King, 2006; McBride, 1990; Sutton, 2004). Defenders of saviour siblings have responded that the Kantian injunction against instrumentalizing human beings prohibits the treatment of others solely as a means to an end and that the creation of a saviour sibling does not involve this because the parents of the child that is born will inevitably also love this child for its own sake (Boyle and Savulescu, 2001; Devolder, 2005b; Sheldon and Wilkinson, 2004). The significance of this claim is in turn tendentious because, while it may be true that parents will love the saviour sibling, it is in many cases less clear that they would have had this child were it not for the desire to source tissue for transplant; consequently, in making the decision to conceive a child they may well have been doing so solely as a means to an end.

If the creation of saviour siblings is ethical, it must be the case that the creation of human embryos for the purpose of saving a life of an existing child is ethical – although this in itself does not settle the further question of the ethics of creating embryos with no intention of creating a living child. However, if the objection to the treatment of the beginnings of human life in the hypothetical creation of saviour embryos relates to the instrumentalization of human beings then it might be argued that it is in fact preferable to instrumentalize an embryo rather than a child. Any child born as a result of the need for a saviour sibling will grow up with the realization that they were conceived for the sake of making tissue for transplant; the circumstances of their conception may have psychological consequences (King, 2006; Sutton, 2004). This will not be the case with the creation of saviour embryos where, if instrumentalization occurs, it occurs without any consequences for any particular person. In this important regard, the creation of saviour embryos is arguably more ethical than the creation of saviour siblings.

The fundamental disanalogy

This paper has identified multiple analogies between the ways in which embryos are treated in and by existing reproductive technologies and the proposed creation of saviour embryos. Yet none of the technologies surveyed thus far contains all of the elements involved in the creation of

saviour embryos. Moreover, the creation of saviour embryos would involve the creation of an embryo with no intention of bringing a child into the world – a feature shared by none of these other reproductive technologies.

Indeed, strictly speaking, while it would involve the creation and manipulation of human embryos, the creation of saviour embryos would not be a reproductive technology at all. Instead, it would involve the use of IVF as a 'therapeutic' technology. This represents the most profound ethical challenge posed by the creation of saviour embryos: is it ethical to treat human embryos as a resource to be exploited rather than – or as well as – as the beginning of a (potential) human life (FitzPatrick, 2003)?

Posing the ethical question in this way dramatizes the shift in the justification for the creation of embryos involved in the production of saviour embryos. However, it is worth immediately noting three things. Firstly, while this procedure would use embryos, it would use them for the sake of saving a human life, a project which, as noted above, is more morally praiseworthy than many of those in which embryos are created and destroyed (Fost, 2004; Harris, 2006): the presence of an instrumental attitude should not be taken to exclude the existence of a virtuous intention. Secondly, further argument would be required to show that this shift in attitude towards embryos would lead to any change in attitudes towards children or adults. Assertions of a 'slippery slope' need to be backed up by a plausible account of the causal mechanism leading to the repugnant result (Burgess, 1993; Sheldon and Wilkinson, 2004; Williams, 1985). They also need to be sensitive to empirical data about the degree to which the anticipated changes have occurred in other, relevantly similar, circumstances. This latter observation is important because, thirdly, to an extent, this change in the status of (some) embryos has already happened – at least in those jurisdictions where embryos are used for research. It also seems likely that, in the not-too-distant future, other therapeutic technologies involving embryos may be developed.

Further analogies

Consequently, three further analogies may productively illuminate the ethics of the creation of saviour embryos. The first involves the destruction and use of embryos in projects other than that of bringing a child into the world. The second involves the hypothetical creation of a child via IVF with the intention of using the surplus embryos created in this process as saviour embryos. The third involves the creation of embryos for therapeutic purposes.

Use of 'surplus' embryos post-IVF

As noted above, IVF will typically involve the creation of multiple embryos but only the implantation of a small subset of these. The majority of couples undergoing IVF will therefore be left with a number of frozen embryos after they have succeeded in having a child. The question of what to do with these 'surplus' embryos has been one of the most controversial and vexed ethical issues surrounding IVF (de Lacey, 2007; Singer and Wells, 1984). In a number of jurisdictions, including Australia, the option is now open to couples to make these embryos available to scientists for use

for research (Knowles, 2004; Research Involving Human Embryos Act, 2002). The argument for this practice is compelling: as these embryos are going to be destroyed anyway it seems preferable that their existence should contribute to the possibility of improving human wellbeing in the future (Devolder, 2005a; Harris, 2006; Savulescu, 2000).

In so far as the use of embryos for research purposes is ethical, their use for therapeutic purposes would also seem to be ethical given that the latter would, *ex hypothesi*, result in an immediate and concrete benefit to identifiable human beings whereas the former involves only the possibility of some future benefit. However, it remains the case that research on surplus embryos involves using embryos that already exist rather than creating them for this purpose.

Before leaving this analogy, though, it is worth noting that the existence of surplus IVF embryos opens up the possibility of deriving cell lines for therapy without needing to create saviour embryos. For instance, if the couple who had a sick child had already undergone IVF they might be able to find a tissue match with one of their existing surplus embryos. They could then consent to the destruction of this embryo for the purpose of deriving stem cells and then the appropriate cell lines from it to use to save the life of their sick child. Given that this embryo would otherwise be destroyed – and especially if the parents have the right to donate the embryo for destructive research – it is difficult to countenance any objection to this procedure. Perhaps slightly – but only slightly – more controversially, the parents of the child requiring a transplant could seek the help of other couples who had undergone IVF and who had surplus embryos to see whether a tissue match could be found with any existing embryo anywhere. Again, as long as the appropriate consent was secured from those responsible for the embryo, it seems as though deriving cell lines to save the life of an existing child, from an embryo that would otherwise be destroyed, would be ethical.

Saviour donated siblings

If the use of surplus embryos for therapeutic purposes is ethical, the possibility arises that the parents of a child requiring a stem cell transplant might arrange to provide an embryo to another couple in need of a donor embryo for reproductive purposes and undergo IVF and PGD in order to do so, in the hope that any surplus embryos created could serve as a source of tissue for their existing child. They would therefore enter the IVF programme with the intent to conceive a child. Once the other couple had secured the birth of a child using one of the embryos that the parents of the sick child had created, the parents of the sick child could then consent to allow their remaining embryos to be used for 'research' into the derivation of stem cells. If this derivation is successful, the parents of the sick child could then hope that these tissues might be used in therapy to save the life of their child. In such a scenario, the child born as a result of the donation could then be said to be a saviour sibling to the sick child, although the cells used to save the life of the sick child would in fact be derived from another embryo.

Of course, if the parents can find another couple willing to have a child conceived of their gametes, they might equally well request that PGD be used to ensure that this

child could serve as a tissue-matched donor to save the life of their child – in which case there would be the creation of a saviour sibling born to a couple who are not the genetic parents of the child. To generate the precise scenario envisioned here, it would therefore have to be the case either that the tissues required for transplant could not be sourced except from embryonic stem cells or that the embryo donors could not rely upon the birth parents to consent to allow the child to serve as a tissue donor. In any case, the interesting question about this scenario is not whether or not it would be the only or the best way to achieve the parents' goals but whether or not each individual step in the process described would be ethical.

Note that in the above scenario, all the embryos conceived are created with the intention of bringing a child into the world. This procedure would therefore avoid objections based on the moral impermissibility of the deliberate creation of embryos for the purposes of destroying them. Note also that the couple seeking a donated embryo have a more plausible case that they will love the resulting child for its own sake than the parents of ordinary saviour siblings. The creation of saviour donated siblings in this scenario therefore appears to be more ethical than in the ordinary case of the creation of saviour siblings.

It seems, therefore, that a compelling case could be made for this course of action: the creation of a 'saviour donated sibling'. Nevertheless, it is hard to avoid the suspicion that, at some level, the distinction between this scenario and the creation of saviour embryos is casuistry. If the therapeutic use of tissue derived from embryos is sometimes ethical, it is difficult to see how whether it is ethical or not could depend on whether or not another child had been born as the result of the process in which the embryo was created.

Therapeutic cloning

Bioethicists have already extensively discussed an arguably much more powerful technology, which is related to the one under investigation here. 'Therapeutic' cloning would involve using somatic cell nuclear transfer to create a blastocyst from which to derive embryonic stem cells and then specific cell types that were genetically identical to the cells of the person being treated for transplant or other therapies. As noted earlier, recent advances in the creation of induced pluripotent stem cells suggest that it may eventually be possible to derive patient-specific stem cells for therapeutic purposes from somatic cells without the need to involve a human ovum or to create a blastocyst, in which case the justification for therapeutic cloning would lapse. However, what is important for the purposes of the argument here is the fact that numerous discussions of the possibility of therapeutic cloning have argued that it would be justified if it offered real therapeutic benefits.

Therapeutic cloning might be argued to be more ethical than the creation of saviour embryos on the grounds that it does not involve conceiving new embryos by fusing spermatozoa and eggs but only involves making copies of a genetic blueprint that already exists and could be further copied as required. However, this intuition relies on a misconception that genetically identical embryos would grow up to be the 'same' person. The creation (or destruction) of cloned

embryos is no different to the creation (or destruction) of ordinary embryos – at least as far as the moral status of the embryos is concerned (Savulescu, 2000). Identical twins do not have a lesser moral status by virtue of being clones; neither should embryos which are genetically identical to each other or to an existing person.

Thus, like the creation of saviour embryos, therapeutic cloning would involve the creation of embryos with the intention of using them for therapeutic purposes. If therapeutic cloning would be ethical, so too would be the creation of saviour embryos. Of course, those who object to the creation of embryos for purposes that would involve destroying them are unlikely to hold that therapeutic cloning would be ethical, so, as was the case with the observations above about abortion, the argumentative traction of this analogy with those entirely opposed to the instrumental use of embryos may be limited. Nevertheless, the analogy with therapeutic cloning does establish that the creation of saviour embryos would be no more radical a step than another proposed technology with numerous defenders and substantial popular support (Devolder and Savulescu, 2005; Savulescu, 2000; Tooley, 2006).

Conclusion

This paper has explored multiple analogies between the proposed creation of saviour embryos and existing reproductive technologies, which productively illuminate the ethical issues involved. With the exception of the deliberate conception of embryos for purposes that would involve destroying them, all of the other controversial aspects of the treatment of embryos in this procedure may be found in existing reproductive technologies that are widely believed to be ethical. However, endorsing saviour embryos would significantly transform the rationale for IVF in such cases, rendering it a therapeutic technology. It would also involve the instrumentalization of human embryos. In both of these regards, though, the creation of saviour embryos is akin to the proposed creation of cloned embryos for therapeutic purposes. These proposals should therefore stand or fall together. Moreover, it is possible that the creation of saviour embryos will offer the possibility of saving lives significantly sooner than therapeutic cloning. Finally, there exists a plausible set of actions and intentions that would allow the therapeutic use of an embryo deliberately created for the purpose as long as another child was born as a consequence. If this is casuistry, as suggested herein, then it may be necessary to rethink the ethics of donation of embryos for research or our objections to the therapeutic use of embryos.

It is very likely that, if the technology to derive useful tissues from embryonic stem cells arrives before a safe way of deriving the same tissues from somatic cells, (some) desperate parents will demand to be allowed to create saviour embryos. Where the lives of children are at stake, it will be difficult to resist this call unless there is a clear consensus that this procedure would be unethical. Yet the deliberate creation of the first stages of human life for purposes which require their destruction is likely to be extremely controversial. It is therefore vital that medical ethicists should begin discussing these possibilities now.

The authors hope that this article may serve as a useful starting point for this process.

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