

CONTENT *The essay deals with the moral status of the embryo, in particular, with the specific moral problems caused by the technique of therapeutic cloning. It focuses on the argument from potential according to which the potential of the embryo to develop significant moral qualities is itself morally significant. After clarifying the ontological and normative aspects of this argument the essay pleads for a 'moderate' position: the embryo at the blastocyst stage is not a person, but it has nevertheless a moral status that requires protection from all detrimental actions which are not aiming at the benefit of a patient.*

Ethical problems of therapeutic cloning

An argument from the embryonic potential

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In January of 2008, a group of American scientists led by Andrew French announced that they had succeeded in cloning a human embryo using the method of somatic cell nuclear transfer (SCNT). By the same method, the sheep 'Dolly' was famously cloned 11 years before⁽¹⁾. According to this method, the nucleus of a differentiated adult somatic cell is transferred to an enucleated oocyte by injection or electro fusion (*Figure 1*). This transfer enables the highly specialized programme of the somatic cell's genome contained in its nucleus to be reprogrammed back to the stage of totipotency⁽²⁾. Since the cloning of 'Dolly' there has been a broad discussion of whether it is morally admissible to use the SCNT method to produce human embryos⁽³⁾. In the context of this discussion a distinction is being made between reproductive and therapeutic cloning⁽⁴⁾. Whereas reproductive cloning aims at generating offspring that are genetically identical to the donor of the somatic cell, therapeutic cloning is characterized as bringing human embryos into existence especially for research purposes with the long-term objective to obtain pluripotent em-

bryonic stem cells that could help to cure diseases involving the destruction of cell tissue, like Parkinson's disease⁽⁵⁾. The embryonic stem cells are obtained from a certain cell type in the interior of the blastocyst (the so-called blastocyst stage is reached approximately four days after fertilization), a process which leads to the destruction of the embryo (*Figure 2*)⁽⁶⁾. The supposed advantage of the use of SCNT-embryos over so-called 'spare' or surplus embryos, that have actually been generated *in vitro* to cause a pregnancy, but could, for different reasons, not be transferred to a uterus, consists in avoiding an immunological rejection of cell tissue by the employment of a nucleus of the patient to be treated.

Thus, therapeutic cloning differs from reproductive cloning in two respects: first in regard to the motive for which the cloning process is carried out, and secondly because of the destruction of the embryo. And it is exactly these two features that make this method ethically problematic. For, if embryos have the same moral status that we usually ascribe to persons⁽⁷⁾, it is beyond all doubt that a practice which, in Kantian terms, uses

them solely as means for the welfare of others rather than as ends in themselves⁽⁸⁾ and that ultimately destroys them would be morally wrong.

The moral problem

There are at least two approaches to determine the moral status of an embryo. One is to compare different moral theories with regard to what they say about this subject. However, such a strategy would go beyond the scope of this paper. In addition, it would also have the disadvantage that, quite independently of the case at hand, all moral theories known up to now are liable to more or less strong objections which impede a general acceptance of their central theses. It is, therefore, more promising to start from one or more rules and principles that are largely uncontroversial – here, the norm that we must not kill innocent persons – and to examine whether and to what extent they apply in the case of embryos. The answer to this question depends on which reasons can be given for this norm in view of the fact that at least most of us do not think that this ban on killing covers all animals as well. There are, certainly, several

ways of arguing for this norm (and these ways are surely connected with different ethical theories), but they all justify the special status of human beings by focusing on certain features that mark them off from at least many animals. Depending on the underlying theory, one or more of the following mental states and capacities are among others deemed to be relevant in this context: intentionality, the capacity to conceive of oneself as existing over time, self-consciousness, rationality, second order volitions, self-determination, moral autonomy, desires, interests, preferences (such as plans for the future) and the capacity to suffer⁽⁹⁾. Now, it is quite evident that an embryo in the blastocyst stage has none of these qualities. But it is just as evident that human embryos without serious defects can, under suitable circumstances, develop into human beings that have these qualities and they differ in this respect from most animals and their embryos. According to the argument from potential this potential of a human embryo is morally central⁽¹⁰⁾. Other arguments have also been put forward in order to support the view that human embryos have the same or at least nearly the same moral status as postnatal human beings. The most important of these arguments are⁽¹¹⁾ the *continuity argument*, which states that all post-fertilization events comprise a continuum of developmental changes in a way that makes it impossible to mark breaks in the developmental process, and thus isolating any one stage at which to attribute the attainment of moral status would be arbitrary; the *identity argument*, according to which it is the numeric and/or genetic identity of the embryo with the postnatal human being into which it can develop that is morally relevant; and the *genetic argument* which considers the embryo to have personal qualities because it possesses (at least at the 4-8-cell stage of preimplantation development, when human gene expression first occurs)⁽¹²⁾ the complete and unique genetic information that already contains all essential and characteristic

features of the human being into which it can develop. The *continuity argument's* problem is one of logical deduction: the impossibility to say *when exactly* a developmental process of a morally relevant quality is *completed* does not imply that there is *no moment at all* at which we could say without arbitrariness that the embryo *definitely* has this quality⁽¹³⁾. The *identity argument* fails because it gives no reason why the genetic and/or numeric identity with a being that possesses morally relevant qualities should itself be morally relevant (for, regarding the morally relevant qualities there is no identity at hand)⁽¹⁴⁾. Finally, the *genetic argument*, apart from the fact that SCNT-embryos as clones are not genetically unique, is not convincing for two reasons. First, genetic uniqueness is not limited to human beings – the genome of any vertebrate is unique as well. Secondly, it is not clear whether all essential character traits of a human being are genetically determined⁽¹⁵⁾, and even if that should be the case, why it would be morally relevant. Since it is not possible to scrutinize all these arguments here, and since the argument from potential is the strongest and most influential among them⁽¹⁶⁾, it alone will be dealt with more thoroughly in the following.

The argument from potential

• The argument from potential can be characterized as holding that an embryo's potential for acquiring morally significant qualities is itself morally significant. The structure of the argument is as follows⁽¹⁷⁾:

premiss 1: It is morally wrong to kill a potential person⁽¹⁸⁾

premiss 2: Human embryos are potential persons

conclusion: It is morally wrong to kill human embryos

In dealing with this argument, two levels have to be distinguished: (i) the ontological level, which is concerned with identifying the point at which embryos have this potential and whether the same potential could also be ascribed to the unfertilized egg,

the sperm or even each somatic cell that can be made to be an embryo by using the SCNT method, and (ii) the normative level, which involves the question of what ethical consequences are to be drawn from the ontological findings in (i). However, the discussions on the ontological level are not independent of normative considerations. For if unfertilized eggs, sperm, or somatic cells were to turn out to be ontologically potential persons in the same way as the fertilized egg or even later stages of the embryonic or fetal development, then, according to the argument from potential, they would all have the same moral status. But then the argument would lead straight to absurdity. The destruction of a somatic cell, for example by scratching one's arm, would then be murder. To be sure, the abjection, resulting from that conclusion, of the socially widely accepted and practised contraception by condom, pill, or coil would in itself not be an argument against granting the embryo a right to life; for even if it is morally as wrong to kill embryos as to practise contraception, the state of the moral universe in which at least one of these (moral) rules were realised would still be the better one. Yet an argument or principle which implies strongly counter-intuitive or even unrealisable demands (like the protection of each somatic cell) can't claim validity even in cases that seem to be less problematic. Therefore, a notion of potentiality that avoids the implausible consequences just described must be found.

The ontological level

• In determining the potential of human SCNT-embryos one question immediately arises: Are these embryos totipotent in the strong sense, that is, can they develop personal qualities, or is such a development *biologically* impossible? Both the successful cloning of many animals and the experimentation on human SCNT-embryos suggest that it is possible. Another way of denying the potential of the SCNT-embryo to develop into a person consists in pointing to the fact

that, in therapeutic cloning, there is no intention to let the embryo develop past blastocyst stage. No embryo generated only for therapeutic purposes can, so this argument runs, be a potential person because of its being destroyed at that stage⁽¹⁹⁾. Moreover, there is a general difference between embryos in the laboratory and embryos in the womb: whereas an embryo in the womb has some definite chance of developing into a child unless a deliberate human act interrupts its growth, an embryo in the laboratory can only develop into a child if there is a deliberate human act⁽²⁰⁾. However, by making the potential of an embryo dependant on our decisions about it, such a view equates potentiality with possibility⁽²¹⁾. Buckle has rightly objected that, in this very broad sense, the notion of potential is too indiscriminating to found, without further qualification, any moral argument because any entity has indefinitely many different potentials; whatever an em-

bryo could possibly become, or be transformed into, would be its potential. An embryo would then not only be a potential person, a potential experimental subject, or a potential abortus, but also a potential meal for the dog or whatever human ingenuity can make of it⁽²²⁾. But the potential of an embryo (or any other entity) is independent of what we do or what we are going to do with it. For it is not the potential, but only the likelihood that this potential will be actualized that is dependent on the embryo's implantation into a uterus. In the same way as acorns do not only become potential oak trees when they are planted (they rather can only become oak trees because they *are* already potential oak trees before they are planted), it is not owing to the implantation in the womb that an embryo has the potential to develop personal qualities⁽²³⁾. If the relevant circumstances conducive to the unfolding of an entity's potential do not apply (in the case of the embryo: if it is

not implanted), then 'this shows only that its potential will be frustrated (will not be actualised), not that it lacks such potential'⁽²⁴⁾. Thus, the potential of SCNT-embryos can be conceived of as a quality of their own, inherent to them and that can be ascribed to them in spite of the fact that these embryos are never intended to be implanted in a uterus.

However, this result is not sufficient for avoiding the undesirable consequences mentioned above. For it can also be said about sperm, an unfertilized egg, and the nucleus of a somatic cell that it is a quality of their own and, thus, of their potential that they can be part of a process which results in an embryo⁽²⁵⁾. It has been put forward against an equal treatment of these potentials that the embryo is different in that it is numerically identical to the person it has the potential to become⁽²⁶⁾. Indeed, numerical identity between the embryo and the possible future person would grant that the unfertilized egg and the sperm do not have the same potential as a fertilized egg. Otherwise each of them would not only have to be identical to the fertilized egg but, by the transitivity of identity, also identical to each other, which is manifestly false⁽²⁷⁾. However there are good reasons to deny that there is numerical identity between an embryo in the blastocyst stage and the possible future person. First, although each cell of the blastocyst has the capacity to differentiate into any of the cell or tissue types of the fetus most of these cells will not become part of the fetus but will form trophoblast, placental and other extra-embryonic tissues⁽²⁸⁾. Secondly, the recombination of identical or non-identical twins (which leads in the latter case to the formation of a human chimera) on the one hand and twinning on the other hand is still possible at that stage⁽²⁹⁾. Attempts have been made to maintain the argument of numerical identity in spite of these biological facts⁽³⁰⁾. But even if the argument can be saved – for example by requiring only a partial numerical identity of the possible future person with the embryo as a

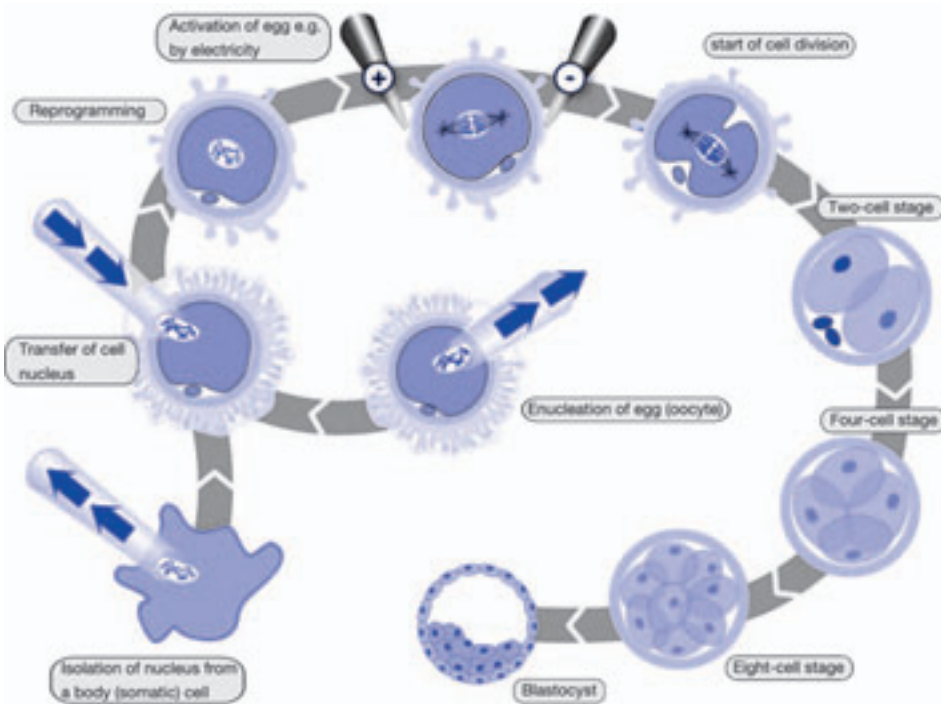


FIG. 1: The nucleus of a differentiated somatic cell can be reprogrammed by transfer to a enucleated oocyte. This oocyte can then be activated and cultured to develop into a blastocyst. Embryonic stem cells isolated from these blastocysts will be genetically identical to the somatic cell. (Reprinted from Deutsches Referenzzentrum für Ethik in den Biowissenschaften (DRZE): Blickpunkt 'Forschung mit humanen embryonalen Stammzellen', March 2009, by kind permission of DRZE)

bodily continuant that endures from the stage of embryo until the stage of person – it is not so clear if it applies to the case of the somatic cell. For that depends on whether we interpret the enucleated oocyte as an environmental condition necessary for the development of the nucleus of the somatic cell into an embryo (and by doing so establish a numerical identity between the nucleus, the embryo, and the possible future person) or if we say that it is a combination of the nucleus and the enucleated oocyte that brings about the development into an embryo⁽³¹⁾. We are confronted here with a difficult problem of the notion of potential: it is sometimes hard to see where exactly to draw the line between the relevant circumstances necessary for the unfolding of an entity's potential and the creation of a new entity through manipulation or fusion with another entity⁽³²⁾. On the other hand, it is beyond any dispute that neither a somatic cell nor its nucleus (nor a sperm or an unfertilized egg) would ever develop into an embryo, fetus or person, *even if they were implanted into a womb*. Therefore, the potential of an SCNT-embryo obviously has another *quality* than the potentials of a somatic cell or its nucleus⁽³³⁾. And this is neither challenged by the fact that (in the case of an implantation and successful growth) not only a fetus but trophoblast and placenta tissue *also* develops, nor by the possibility that this potential can turn out to be twofold (in case of twinning) or that recombination can occur (after twinning).

Thus, *if* the argument from potential is valid, it is possible to ascribe a potential to the SCNT-embryo granting that only embryos but not sperm, unfertilized eggs or somatic cells fall within its realm.

The normative level

• But what is the normative relevance of this potential of an SCNT-embryo? The fundamental objection against the argument from potential says that, in general, we do not treat potential qualities and actual ones as equivalent in our normative judge-

ments⁽³⁴⁾. This is often illustrated by the following two examples⁽³⁵⁾: (i) although Prince Charles is a potential king, he does not currently have the rights of a king, and (ii) to pull out a sprouting acorn is obviously not the same as cutting down a venerable oak. While it is completely right that there is no rule or principle that states that a potential X *always and under all circumstances* has the same value and the same rights as an X, this does not show that potentials are never morally relevant. Therefore, we have to verify whether the cited examples

are actually analogous to the situation of a human SCNT-embryo. In order to do that in an adequate way, it is useful to examine what kind of potential the embryo has and what function it holds in the argument from potential. The potential is, as we have already seen, a quality of its own and inherent to the embryo (that means independent of all decisions, actions and circumstances that may concern it). It is due to this quality that it should get the same individual, intrinsic moral value that we ascribe to persons and that should especially protect it from

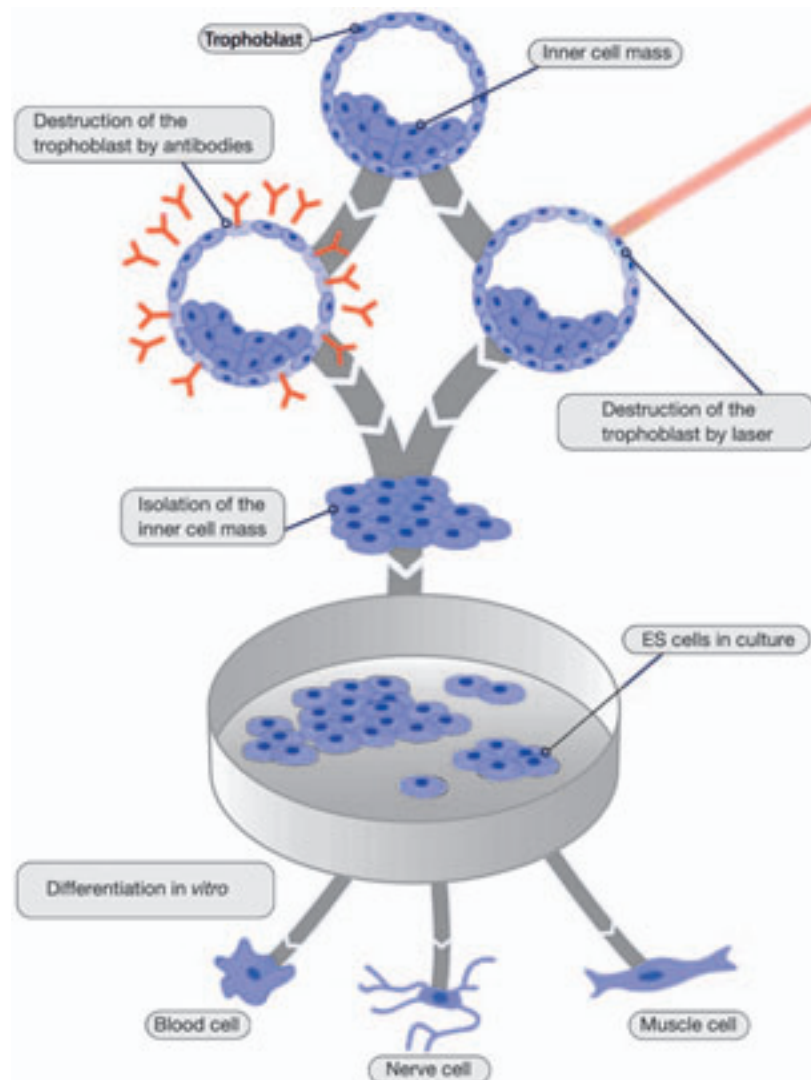


FIG. 2: Isolation and cultivation of embryonic stem cells from blastocysts. After destruction of the trophoblast, cells of the inner cell mass can be isolated and cultured as embryonic stem cells. After the addition of tissue-specific growth factors to the culture medium, the stem cells will begin to differentiate. (Reprinted from Deutsches Referenzzentrum für Ethik in den Biowissenschaften (DRZE): Blickpunkt 'Forschung mit humanen embryonalen Stammzellen', March 2009, by kind permission of DRZE)

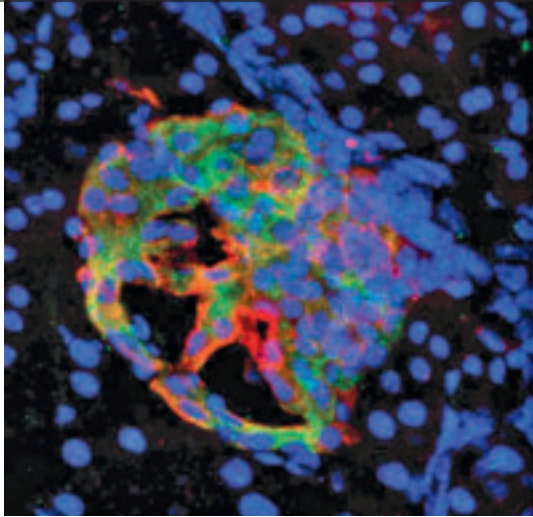


FIG. 3: Genetically marked insulin-producing β cells (red and green) that were used to derive iPS cells after introduction of the transcription factors *Oct4*, *Sox2*, *Klf4* and *cMyc*. (Figure courtesy of Konrad Hochedlinger, Harvard Stem Cell Institute, Boston, MA, USA).

all practices that involve its death⁽³⁶⁾. So to have a real analogy we need a case in which an entity $E_p(\text{potential})$ has such an inherent potential to develop into an entity $E_a(\text{actual})$ that has, as an individual, an intrinsic value (that is a value not due to the esteem by, or the benefit of other beings) and in which it is owing to this potential that this intrinsic value is 'transferred' from E_a to E_p (or in which there is no such transfer in spite of the potential of E_p). Since 'potential' in 'Prince Charles is a potential King of England' refers to the mere *possibility* (which depends mainly on institutional and legal conditions of the line of succession and not on qualities inherent to him) that he will one day be King, this kind of potential is obviously quite different from the developmental potential of a SCNT-embryo. An acorn has a potential inherent to it, but it can be queried whether the venerable oak into which it can develop has an intrinsic value and, even if it has one, whether it has it as an individual specimen (as in the case of actual persons) or only as a member of a variety the continued existence of which is protected. Furthermore, it should be taken into consideration that the intrinsic value of a person is, unlike the intrinsic value of an oak, an absolute, or at least very high intrinsic value, and it could be argued that the transfer of the intrinsic value from E_a to E_p is stronger the higher

the intrinsic value of E_a is. Thus, these examples are not convincing as objections to the moral consideration of the potential of embryos and fetuses. Of course, these examples' lack of persuasive power does not imply the validity of the argument from potential. What can be said in favour of this argument?

Damschen and Schönecker try to show the moral relevance of the developmental potential of the embryo by comparing it to the potential of a coma patient. If we consider the *capacity* of the coma patient to realize morally relevant qualities in the future as being morally relevant, then, they argue, it would be inconsistent not to respect the *faculty* of the embryo to develop such qualities⁽³⁷⁾. For why, they ask, should the actually not-realized *capacity* of the coma patient be more highly valued than the actual *faculty* of the embryo? After all both can not *actually* display these moral qualities, but both have the *dispositional possibility* to display them in the future and it can not make any moral difference that the realization of these qualities takes at least 9 months in the case of the embryo, whereas in the case of the coma patient perhaps only a few hours⁽³⁸⁾. Damschen and Schönecker concede that an embryo and a sleeping human being or a coma patient differ in that the latter formerly had the qualities in question already actualized, but they do not think this difference to be morally relevant since, as it is shown by our behaviour towards brain-dead persons and newborn children, it is only the *dispositional possibility* to possess these qualities in the future that matters. For although the situation of a brain-dead person and a coma patient is identical in that they had these qualities in the past while newborn children never had them. Yet we allow brain-dead persons, but not coma patients and newborn children to die⁽³⁹⁾. In evaluating this argument, we should take into consideration that it is not without problems to conclude from the existence of our moral practice that this practice is justified. On the other hand, it has to be

admitted that, even if there is no logical connection between our factual behaviour and its moral justification, good reasons must be given when a practice is to be questioned or changed which is, as in this case, in accord with fundamental convictions of nearly all people, and which, moreover, does not contravene or contradict other fundamental convictions of these people. Now there are, however, also situations in which we act differently towards newborn infants and embryos and in which this behaviour is based on deeply rooted convictions as well. For example, if there is a fire in a biotechnical laboratory of a hospital and a fireman has to make the choice as to whether to save a newborn child or one or even more embryos in test-tubes or Petri dishes, nearly everyone would say that he is obliged to save the life of the newborn child⁽⁴⁰⁾. Certainly, this thought experiment does not *prove* that embryos deserve no protection at all. For from the fact that in the described situation only one of two living beings can be saved and one is to be saved instead of the other, it does not follow that the other being has no relevant moral status⁽⁴¹⁾. In particular, it has not been showed that embryos have a moral status that permits legalizing their killing under 'normal circumstances', that is apart from emergency situations. Nevertheless, it is clear that everyone who thinks that the newborn child should be saved can not consistently maintain that a newborn child and an embryo have the same moral status⁽⁴²⁾. At least at first glance it therefore seems plausible to parallel the newborn child in the thought experiment with a patient whose life can *only* be saved by means of embryonic stem cells⁽⁴³⁾. However, up to now, no (human) disease can be cured by means of embryonic stem cells obtained from SCNT-embryos and it is not even sure if this will ever be possible. Moreover, since there are other therapies, such as the use of adult stem cells, that are morally unproblematic, it is doubtful that the use of embryonic stem cells is the only possibility to help a pa-

tient. And even if the use of embryonic stem cells were the only established and efficient therapy for saving the life of some patients, the situation would still differ from the fire scenario in the laboratory. In this example, it is only the patient and not the embryo that is in an emergency; if we do nothing, 'only' the patient but not the embryo will die; it is not only because of the emergency that we can (and must) make the decision as to which entity to save but rather because we have somehow contributed to the coming about of this possibility⁽⁴⁴⁾. Thus, despite being very plausible, the cited thought experiment does not automatically justify the killing of embryos for medical purposes.

What can we conclude from these reflections about the ethical relevance of the developmental potential of an embryo? First, there are good reasons for holding that an embryo does not have the same moral status as a child. But, as already stressed, this does not mean that it deserves no protection. Even some examples put forward to refute the moral relevance of the potential of the embryo suggest the opposite: Prince Charles does not have the rights and responsibilities of a king, but his being a potential king means that he is treated differently than the British average citizen⁽⁴⁵⁾. Since the potential of an embryo is inherent to it and, thus, not dependent on contingent decisions about it, and the qualities it can develop have intrinsic value, its potential is 'stronger' than the potential of Prince Charles both in ontological and normative respects. It is therefore just consequential to ascribe some normative relevance to the potential of an embryo. Moreover, since the qualities the embryo can develop because of its potential are of great moral importance, it is entitled to a measure of respect beyond that accorded to embryos of other species⁽⁴⁶⁾. Therefore, it is quite plausible to ascribe to embryos an intrinsic value that is not absolute, but high enough to prohibit all methods and actions involving their death without having a realistic therapeutic benefit. Permission to research in this

area should only be given if the following conditions are met⁽⁴⁷⁾:

1. The research project must be of eminent ethical importance. The curing and saving of ill persons is an important goal, but it is not sufficient to pursue this goal in a quite general and abstract way; there must be a realistic chance for a direct or at least indirect clinical benefit resulting in concrete prophylactic, diagnostic and therapeutic progress⁽⁴⁸⁾.

2. Whether and to what extent the realisation of this clinical benefit is realistic must be settled in advance by scientific-medical examinations. In order to avoid an unnecessary expenditure of human embryos, these examinations should first be done through animal experimentation.

3. Even if the conditions 1 and 2 are satisfied, embryo research that entails the destruction of embryos can only be permitted if there are no other alternatives available which are ethically less problematic and which, should they also involve the death of embryos, satisfy in their turn the requirements in 1 and 2⁽⁴⁹⁾.

In regard to the method of therapeutic cloning it can be established that this technique is still on the level of basic research⁽⁵⁰⁾. Since severe aberrations have been observed in animals cloned by SCNT, there is definitely a risk of the transplanted cell tissue being carcinogenic, and since it is not clear whether the goal of avoiding immunological rejection of cell tissue can be achieved, alternative methods of obtaining embryonic stem cells should also be taken into consideration. Recent successes in reprogramming human somatic cells into pluripotent stem cells (so-called induced pluripotent stem cells) by introducing developmental control genes are especially promising here. The present state of research indicates 'that the reprogramming exit ramp does not have to lead back to an embryonic state but can take a cell directly to a new mature fate'⁽⁵¹⁾, implying that this technique may not necessarily raise the moral problems that methods which bring about the destruction of embryos do.

Footnotes and References

1. Cf. French, A. J. et al., www.StemCells.com, Stem Cells Express, published online January 17, 2008; doi: 10.1634/stemcells.2007-0252. For the clone sheep 'Dolly' see Wilmut, I. et al. (1997) 'Viable offspring derived from fetal and adult mammalian cells', *Nature* 385, 810–13.
2. *Totipotency* is meant to be both a) the ability of a single cell such as a fertilized egg cell, to construct a complete, viable organism, and b) the ability of a stem cell to differentiate into every cell type of an organism. *Pluripotency* is the ability of a cell to differentiate into nearly all cells, for example the descendants of each of the three blastodermic layers. This phenomenon can be seen in embryonic stem cells, among others (cf. Schöler, H. R. (2007) 'The Potential of Stem Cells: An Inventory,' in: Knoepffler, N. et al. (ed.), *Humanbiotechnology as Social Challenge, An Interdisciplinary Introduction to Bioethics (Wiltshire)*, 28). We use the term 'embryo' in the following to refer not only to the embryo as individual human being until the end of organogenesis (circa eight weeks after fertilization), but also to any fertilized egg and any totipotent cell.
3. On May 19th 2008 the British parliament has allowed the transfer of human cell nuclei in enucleated animal oocytes. Since the enucleated oocytes contain mitochondrial DNA, the transfer leads to the development of a chimera. According to the British law these 'chimerae-embryos' must be destroyed within 14 days (*Deutsche Welle*, May 21, 2008, via Internet). The ethical evaluation of such procedures depends on whether and to which extent we consider this chimera to be human or animal and whether we think that such a being is already as an embryo harmed by having parts of another species in itself.
4. Cf. to the ethical problems of reproductive cloning Ach, JS, Brudermüller, G., Runtenberg, C. (1998) Hello Dolly, Über das Klonen (*Frankfurt a. M.*); Bormann, F.-J (2004) 'Forschungs- und Fortpflanzungsklonen beim Menschen, Eine kritische Analyse aus ethischer Sicht,' *Zeitschrift für medizinische Ethik* 50, 131–51.
5. Besides the method of cloning of embryos by SCNT in order to obtain embryonic stem cells, other procedures can be subsumed under the term 'therapeutic cloning' (cf. the survey in Rendtorff, T. et al. (2000) 'Das Klonen von Menschen – Überlegungen und Thesen zum Problemstand und zum Forschungsprozess,' in: Knoepffler, N., Haniel, A. (ed.), *Menschenwürde und Medizinethische Konfliktfälle (Stuttgart)*, 18–20). Especially the possibility of 'embryo splitting' is worth mentioning here: it would mean to split *in-vitro*-fertilized embryos so that each time two genetically identical embryos would come into being. While the one would develop into a complete human being,

- the other one would be frozen at a certain stage and functions as a donor if its twin needed a transplant. The advantage of this method would be that no mature oocytes would be needed for the generation of the embryo; the obvious disadvantage, however, would be that only patients who have been generated *in vitro* and who were split as embryos would profit from it.
6. Since it blurs this lethal consequence, the use of the term therapeutic is sometimes criticized (cf. e.g. *Kardinal Lehmann, K.*, 'Therapeutisches Klonen' Ein irreführender Begriff' in: *Stern, Jan 11, 2001*).
 7. The term person here and in the following is meant to refer to any entity that has the same moral status that we usually attribute to *postnatal* human beings. Thus, it is not stated that the quality of being a member of the species *homo sapiens* is a necessary or sufficient condition for being a person. Although this text will only deal with human persons, our use of the term does, therefore, not exclude that there are non-human persons as well.
 8. Cf. *Kant, I.*, *Grundlegung zur Metaphysik der Sitten* (1785) (*Hamburg 1999*), 429. It should be noted that it is not because of cloning that the embryo is solely used as a means for the welfare of others. If, for example, the parents of a child who suffers from leukaemia and hence needs a donation of bone marrow bring a second child into the world for the only reason that this child can function as donor for the first one, then this child would be solely used as a means exactly in the same manner as a SCNT-embryo, although it would have been fathered in a quite natural way.
 9. Cf. *Birnbacher, D.* (2006) *Bioethik zwischen Natur und Interesse* (*Frankfurt a. M.*), 58; *Damschen, G., Schönecker, D.* (2002) 'In dubio pro embryo', in: *Damschen G., Schönecker D.* (ed.), *Der moralische Status menschlicher Embryonen* (*Berlin*), 229.
 10. For proponents of an Aristotelian influenced substance ontology, who often refer to *Boethius'* definition of a person as 'rationalis naturae individua substantia' (*Boethius*, *Liber de persona et dubus naturis contra Eutychem et Nestorium*, cap 3 (PL 64, 1343)) it is not the factual, but the *structural* human capacity to develop the qualities in question that is morally relevant. For, in this view, it is not only in the course of the physical development that personal qualities emerge; the developing body is only the medium for expressing the quality of being a person, which completely exists from the beginning (cf. the critical representation of such positions in *Knoepffler, N.* (1999) *Forschung an menschlichen Embryonen, Was ist verantwortlich?* (*Stuttgart*), 40–41 and 59–61). Therefore, even embryos that, for purely biological reasons, cannot take the normal course of development are persons in this approach. However, this concept seems to rely on an Aristotelian teleological understanding of biology, which is not easy to bring in line with fundamental assumptions of modern biology (cf. to this point and to the whole topic *Corradini, A.* (2004) 'Epistemologische Voraussetzungen der Abtreibungsdebatte,' in: *Lenzen, W.*, *Wie bestimmt man den 'moralischen Status' von Embryonen* (*Paderborn*), 73–93).
 11. For a detailed representation and critique of these and further arguments, see *Knoepffler, N.* (1999) *Forschung an menschlichen Embryonen, Was ist verantwortlich?* (*Stuttgart*), 59–116; id. (2004) *Menschenwürde in der Bioethik, (Heidelberg)*, 56–80; *Damschen G., Schönecker Dieter* (ed.) (2002) *Der moralische Status menschlicher Embryonen* (*Berlin*).
 12. *Bodden-Heidrich, R. et al.* (1997) 'Beginn und Entwicklung des Menschen: Biologisch-medizinische Grundlagen und ärztlich-klinische Aspekte,' in: *Rager, G.*, (ed) *Beginn, Personalität und Würde des Menschen* (*Freiburg*), 70.
 13. Cf. *Merkel, R.*, 'Rechte für Embryonen', *Die Zeit, Jan 25, 2001*, reprinted in: *Nida-Rümelin, J.* (2002) *Ethische Essays* (*Frankfurt*), 433 in allusion to the Sorites.
 14. *Damschen and Schönecker footnote 12, 216–218.*
 15. Cf. *Knoepffler footnote 12, 76.*
 16. Cf. the references in *Damschen and Schönecker footnote 12, 222.*
 17. Cf. for example (with slight differences in terminology) *Leist, A.* (1990) *Eine Frage des Lebens. Ethik der Abtreibung und künstliche Befruchtung* (*Frankfurt a. M.*), 84, *Singer P.* (1993) *Practical Ethics* (*Cambridge*), 152.
 18. Or applied to the Kantian concept of dignity:
 P1: It is morally wrong to use potential persons solely as a means for the welfare of others
 P2: Human embryos are potential persons
 C: It is morally wrong to use embryos solely as a means for the welfare of others
 It is sometimes held that Kant himself has explicitly attributed moral autonomy and thus dignity to the earliest stages of human life. However, this interpretation is not compelling (see the comparison of the relevant passages in: *Knoepffler* (2004) *footnote 12, 36–44* and the analysis of the Kantian position in: *Vossenkuhl, W.* (2006) *Die Möglichkeit Des Guten. Ethik im 21. Jahrhundert* (*München*), 94–104). But the connection of a Kantian concept of dignity with the potential to develop certain qualities (which can be, at least in principle, empirically established) is also criticized for other reasons. It is, so that argument runs, in the Kantian approach due to their being under a categorical, i.e. unconditioned moral obligation, which arises from the human capacity of self-government (that is their *moral autonomy*), that human beings have dignity, and since this moral autonomy is not part of the empirical world, *all* human beings, independently of their actual or potential qualities, have at all stages of their life, and thus, also at the embryonic stage, moral autonomy and, therefore, dignity (cf. *Wieland*, 'Pro Potentialitätsargument: Moralfähigkeit als Grundlage von Würde und Lebensschutz,' in: *Damschen and Schönecker footnote 12, 160–164*). Although it is true that, in the Kantian approach, the existence of moral autonomy as capacity for self-government can not be empirically shown, it can be questioned whether Kant's concept of autonomy and person can really do without a feature like the capacity to conceive of oneself as existing over time (cf. *Siep, L.* (1992) *Praktische Philosophie im Deutschen Idealismus* (*Frankfurt a. M.*), 96–98). Especially, it can be asked what it means to say of an embryo that it is under a categorical moral obligation; in any case it would be plainly absurd to reproach an embryo for having done something morally wrong.
 19. Cf. e.g. *Zypries, B.*, 'Vom Zeugen zum Erzeugen? Verfassungsrechtliche und rechtspolitische Fragen der Bioethik, Humboldtforum der Humboldt-Universität zu Berlin 29. Oktober 2003, 5; see also *Reich, J.* (2004) 'Empirische Totipotenz und metaphysische Gattungszugehörigkeit bei der moralischen Beurteilung des vorgeburtlichen menschlichen Lebens,' in: *Zeitschrift für medizinische Ethik 50, 115–130.*
 20. See *Singer, P., Dawson K.* (1990) 'IVF technology and the argument from potential,' in: *Singer, P. et al.*, *Embryo Experimentation* (*Cambridge*), 87. This difference shows for *Singer and Dawson* that the embryo in the laboratory has the same potential as an egg alone or an egg and sperm considered jointly.
 21. Cf. *Buckle, S.*, 'Arguing from potential,' in: *Singer et al. footnote 21, 93.*
 22. Cf. *Buckle footnote 22, 93–94.* See also *Hursthouse, R.* (1987) *Beginning Lives* (*Oxford*), 81–82; See also *Schöne-Seifert, B.*, 'Contra Potentialitätsargument,' in: *Damschen, G., Schönecker, D.* (ed.) *footnote 12, 180; Bormann footnote 4, 136.*
 23. Cf. *Buckle footnote 22, 105–106; Hursthouse footnote 23, 80.*
 24. *Buckle footnote 22, 106.* *Buckle* illustrates this understanding of the notion of potential by drawing an analogy between potentials and talents: 'If a child is declared to be a potential Mozart, this is a judgement about the child's talent [...]. If the child's parents decide to discontinue the piano lessons necessary for becoming a Mozart, the child's potential is no more affected than is its talent [...]. The lessons (and, indirectly, the parents' decisions about them) are important because of the potential they serve to realize; not because they constitute, or even partially constitute that potential' (105).
 25. That it is *their* potential and not only our decisions and actions that play a crucial part in this process becomes ob-

- vious if one of them is replaced by any other entity: an embryo will never develop from the 'fusion' of a shoe and an egg or from a nucleus of a somatic cell put in an aquarium.
26. Cf. this combination of the argument from potential with an identity condition in Stone, J. (1987) 'Why potentiality Matters,' in: *Canadian Journal of Philosophy* 17, 815–830; *Leist footnote 18, 83–85*; Damschen G., Schönecker D. *footnote 12, 228–230*. In contrast to *absolute* identity, *numerical* identity does, of course, not require that the embryo and the possible later person be identical in all respects; it is quite obvious that they differ in regard to nearly all their qualities. The embryo and the person into which it can develop are only meant to be identical in that they are the same thing, albeit at different stages of development.
 27. For this point in detail, see Stone *footnote 27, 816–820*.
 28. Cf. e.g. Post, S. G. (ed.), *Encyclopaedia of Bioethics, New York 2004*, 717.
 29. Cf. *ibid.*; Damschen and Schönecker, *footnote 12, 243–244*.
 30. Cf. Damschen and Schönecker *footnote 12, 243–250*. With regard to twinning and recombination they distinguish between *possible* and *actual* twinning/recombination. The mere possibility of twinning/recombination, they argue, does not alter the numerical identity between an adult and an embryo if the embryo did not actually divide/recombine. If, however, an embryo has divided or two embryos have recombined, they say that two new embryos have come into being while the first one has died or that one new embryo has come into being and the two first ones have died respectively. In the case of Siamese twins, they argue likewise depending on whether Siamese twins are considered to be *two bodies* of two persons or *one body* of two persons and whether they come from a division (of one embryo) or a recombination (of two embryos). Finally, in order to solve the trophoblast and placenta problems they propose to consider these tissues as a part of the embryo and the fetus until the umbilical cord is cut at birth.
 31. Cf. for the second alternative Damschen and Schönecker *footnote 12, 241–242*; see also Bormann *footnote 4, 138–139*. If we focus on genetic identity instead, the argument becomes absolutely implausible. For while sperm and unfertilized eggs are neither identical to each other nor to the embryo, there is a nearly complete genetic identity between the somatic cell, the embryo and the potential person. Provided that the first premise of the argument from potential is valid, this would lead to the plainly absurd consequence that each somatic cell would have the potential to develop morally relevant qualities and would, therefore, have to be protected.
 32. Cf. Singer and Dawson *footnote 21, 82*, who compare the situation of an embryo in the uterus which needs nutrients for growth with the situation of an (human) egg which can only begin parthenogenetic development if it is stimulated by skilled human intervention: 'The difference seems to be one of degree rather than of kind'.
 33. Cf. Knoepfler *footnote 12, 83*. The different qualities of the potentials of a fertilized egg on the one hand and an egg and sperm taken together but as yet united on the other hand is overlooked by Harris, who seems to conclude from the fact that the potentials of unfertilized egg and sperm are elements of the causal process which can bring about the development of a fertilized egg that all three entities have the same kind of potential: 'For something, or some things, have the potential to become a fertilized egg and whatever has the potential to become an embryo has whatever potential the embryo has' (Harris, J. (1990) 'Embryos and hedgehogs: on the moral status of the embryo,' in: Dyson, A., Harris J. (ed.), *Experiments on Embryos (London)*, 70).
 34. Cf. e.g. Harris *footnote 34, 70*; *Leist footnote 18, 92*; Birnbacher *footnote 10, 370*; cf. also Singer *footnote 18, 153*: 'In the absence of any general inference from 'A is a potential X' to 'A has the rights of an X', we should not accept that a potential person should have the rights of a person'.
 35. Cf. Singer *footnote 18, 153*. Harris tries to demonstrate the implausibility of the argument from potential by pointing out to the fact that although 'we are all potentially dead, no one supposes that this fact constitutes a reason for treating us as if we were already dead' (Harris *footnote 34, 70*). And indeed, it would be absolutely absurd to treat a living human being as if it were dead. But this absurdity stems from the fact that we are here, unlike the case of the embryo, confronted not only with the question whether and how to take into account a potential, but also with a *concurrence* between actual and potential qualities. Yet the argument from potential neither requires nor presupposes *every* potential of an entity to be taken into consideration, at all costs and even to its disadvantage.
 36. This does not mean that the killing of an embryo would be forbidden under all circumstances; but the embryo would be protected in the same way as actual persons.
 37. Cf. Damschen and Schönecker *footnote 12, 232*. They conceive of the potential of an agent as its *dispositional possibility* (Möglichkeit) to do x, to be y or to become z. Furthermore, they distinguish, within this notion, between *capacity* (Fähigkeit), by which they understand the *dispositional possibility* to perform actually (*aktual*) and under favourable circumstances a specific action, and *faculty* (Vermögen), which is meant to be the *dispositional possibility* to develop a specific *capacity*. They call a *capacity not-realized* when the agent is temporarily not able to exercise it (as in the case of the coma patient) (226).
 38. Cf. Damschen and Schönecker *footnote 12, 232–233*.
 39. Cf. *ibid.*
 40. See for this example Merkel *footnote 14, 432*.
 41. If we have, for example, to save a human being instead of a dog, then that does not mean that we are morally allowed to arbitrarily kill dogs.
 42. In this context it should be mentioned that only a small number of embryos imbed themselves in the uterine wall; this biological fact is obviously no reason to include the number of embryos that die in this way in the mortality rate.
 43. Cf. Merkel *footnote 14, 432*.
 44. However, this objection will not be convincing for a straightforward consequentialist, because, for him neither the difference between doing and refraining from doing something nor the question who or what has brought about the situation in which we now have to make a decision are morally relevant (cf. to this topic Williams, B. (1973) *A critique of utilitarianism*, in Smart, J.J.C., Williams, B.; *Utilitarianism For & Against (Cambridge)*, 93–100).
 45. Cf. Knoepfler *footnote 12, 138*.
 46. Cf. UK Department of Health (2000) *Stem Cell Research: Medical Progress with Responsibility – A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health (London)*, 37.
 47. Cf. on these conditions Clausen, J. (2005) 'Sonderstatus und Bedeutung von Kerntransferembryonen,' in: Dabrock, P., Ried, J. (ed.), *Therapeutisches Klonen als Herausforderung für die Statusbestimmung des menschlichen Embryos (Paderborn)*, 135–138.
 48. Cf. Bundesärztekammer (1985) 'Richtlinien zur Forschung an frühen menschlichen Embryonen,' *Deutsches Ärzteblatt* 94, 3758.
 49. The fulfilment of these requirements excludes any development of embryos for arbitrary ends. Like the use of transplants, the expenditure of embryos should solely serve the purpose of making a healthy and autonomous life for future or already existing persons possible (for a discussion of this analogy between the use of transplants and the production of embryos for research and medical purposes, see Vossenkuhl, W. (2002) 'Der ethische Status von Embryonen,' in: Oduncu, F., Schroth, U., Vossenkuhl, W., *Stammzellenforschung und therapeutisches Klonen (Göttingen)*, 169).
 50. Cf. Kompetenznetzwerk Stammzellenforschung NRW, <http://www.stammzellen.nrw.de/de/blickpunkt.php> (October 2008. Accessed January 29, 2009).
 51. (2008) 'Breakthrough of the Year', *Science* 322, 1766.