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Overview of Embryonic Stem Cell Research

Marina PETRIȘOR (ȚICMEANU)¹

Abstract: The purpose of this paper is to debate whether or not the embryonic stem cell research should be permitted, or even encouraged. I will argue that we have a moral duty to encourage the advance of scientific knowledge (by learning how the embryo stem cell works) and to allow developments in medicine (by using therapies resulted from embryo stem cell research), yet understanding the risks that such research and knowledge brings. Therefore, I will discuss a few medical and procedural aspects regarding embryonal stem cells, I will briefly present several perspectives upon embryo moral status and also upon the most important slippery slope dangers concerning embryonic stem cell research. All of these aspects will be approached focusing not only on potential benefits, but mainly on the correct understanding and appropriate calculation of the risks involved.

Keywords: embryonic stem cells, in vitro embryos, medical research, moral status of the embryo.

1. Introduction

The research in modern day medical science brings great knowledge of the human organism, but we have yet to learn so much about the wonders of human life. Such scientific advance comes with great responsibility: we must be fully aware of what such knowledge would mean, what medical and ethical risks it would raise, and what dangers may arise from incorrect or improper use of this important information.

That is why, in this article I will argue that not only we *should* allow research on embryonic stem cells, but we *must* support this type of research given the fact that we need better comprehension of how the human organism works (organs and functioning as a whole). Science needs to understand the most fundamental things about the human organism in order to advance and that knowledge may be in the way that stem cells work. I will explain in the following chapter why this comprehension of human stem cells can only be provided by the embryonal stem cells, and only by it. Also, the research on embryonic stem cells wouldn't be valuable just for advances

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in medical knowledge, but also in the actual curing of extremely serious diseases.

I am completely aware of the ethical vastness of this subject, so I will not discuss matters related on in ethical acceptance of in vitro fertilization. It is most likely that those who are against the embryonic research would argue that we shouldn't allow the unnatural production of these embryos in the first place. But this is a discussion way to broad to approach in here, and it would not serve my purpose.

That being said, in this paper I will refer only to the embryos in a state of blastocyst (4-5 days), which are the surplus from in vitro fertilization, which would otherwise be discarded!

In this respect, I will address the question: does the embryo in a state of a blastocyst have a moral status? On this matter are also a variety of arguments that could not be included due to publishing space limitations, and that is why I decided to analyze only the most recurrent arguments that I found in my work of documentation. Also, there are a few very important slippery slope dangers that researchers should be aware of. Among these dangers that are worth mentioning: human cloning, people cloned for organs, fading the line between what is permissible and what not, regarding to the destruction of human embryos (if we can create and destroy an embryo for research purposes, who is to tell where the boundaries should be, and for what right purposes it is right to create them?) (Farzaneh Zahedi-Anaraki & Bagher Larijani, 2011, p. 93), commercialization of stem cells, the proper obtaining of donors informed consent etc.

I would argue in this article that if researchers would have enough knowledge of what is morally wrong, human kind will be safe from those slippery slope dangers, and that science should be done step by step, or otherwise we will obstruct scientific progress. All of this matters that I will not address in this paper should not be neglected, and I will consider these as subjects for following paperwork.

2. Medical and procedural aspects regarding embryonal stem cells

Before starting the actual argumentation, we must fully understand what stem cells are, what they are capable of accomplishing, which are the major differences between the three stem cells types and why embryonic stem cells research matter the most.

First of all, it should be specified that we knew very little about stem cells until recent years, but what we know now is enough to raise high hopes

for curing diseases known as incurable, and to determine the continuing research on living organisms, especially on human organisms.

Embryonic stem cells, to which I will be referring in this article, are undifferentiated cells that can be found in embryos that possess both the capacity to transform into highly specialized cells and the capacity to transform into all cell types within the organism.

They are in a way, the "source cell". (Nickel, 2008, p. 62) These stem cells, unlike other cells from a living body, have a dualistic nature: stem cells either expand their number while remaining undifferentiated or can differentiate and contribute to the development or the repair of tissues of the body. (Schwartz, Bryant, 2008, p. 19) They are also known for their ability to proliferate into a population of similar cells and for their ability to keep dividing infinitely. (Schwartz, Bryant, 2008, p. 19)

Due to this wide range of potencies, and to the implication that may follow from their research or therapeutic use, embryonic stem cells are very valuable in the biomedical research and possibly in clinics, and very controversial in the perspective of a wide variety of research areas such as medicine, biology, ethics, religion, philosophy, etc.

One of the most important ethical problems regarding embryonic stem cells is that through their extraction, the embryo of provenience is destroyed, which in some views means killing a living being at an early stage of development. In this paper I will argue that embryonic stem cell harvesting should not be counted as murder, and accordingly banned, but, on the contrary, encouraged.

I will be presenting, for this reason, a general picture of the problem, starting with the importance of the matter, and the need for embryonic stem cell research and concluding with an explanation of why, in my opinion, there is no ethical dilemma regarding embryonic stem cells, just ethical problems with various solutions.

Although there are other known types of stem cells, less problematic from an ethical perspective, they are also less promising. The other two known types of stem cells are: adult stem cells and umbilical stem cells.

Adult stem cells are obtained from a variety of tissues: bone marrow, peripheral blood, skin, fat tissue. (Steinbock, 2007, p. 419) Some of the major medical and procedural problems with this type of stem cells are: the harvesting process of adult stem cells is an invasive process, high risk of rejection, the fact that those cells are specific to organs from which they were collected (being unable to form other types of organs), they are difficult

to isolate and they have a limited life span. Another problem would be that they can cure a limited number of diseases.

Umbilical stem cells are extracted from a vein of the umbilical cord and from the new born placenta right after birth. This cell will be frozen until the moment they are requested by the beneficiary (donor, his family or other legitimate beneficiary). This type of cells has a higher level of plasticity compared to adult stem cells, which means that it can transform into a larger variety of cells (that latter may become tissue), fact that directly reflects in the number of the diseases that can theoretically cure.

Umbilical stem cells raise more ethical problems, compared with adult stem cells, because the cells used for treatment are usually collected from the adult subject that has given written consent and is usually used for autologous transplant, while the umbilical stem cells raise ethical problems as: the baby's consent and the right to its own body, baby's autonomy, parent's (mother and father) consent, problems regarding the access of the rightful beneficiary to their own cells and treatments.

Embryonic stem cells are the most promising type of stem cells. While adult and umbilical stem cells can be used as therapy for a limited number of afflictions, embryonic stem cells promise to cure a large variety of diseases, including degenerative diseases, as Alzheimer and Parkinson. (Steinbock, 2007, p. 417)

The problem with this *magical seed* is that there is not enough information about the way it works, and therefore about the specific ways to tell them in which type of cell it should develop, and so, (given the fact that embryonic stem cells are programmed to multiply indefinitely), usually results in growing tumors instead of healthy tissues or organs. This characteristic of instability consisting in programming errors means that a cell that the scientist intended to program to develop into one specific type of cell, grows and develops as another, unintended type of cell.

Although embryonic stem cells seem like a *magic seed*, this type of stem cells raises a multitude of problems of bioethical nature. The most complex problem off all is that related to the moral status of the embryo, given the controversy rising from ethical and religious beliefs regarding the moment when life begins.

Ethical problems regarding embryonic stem cells are not limited to this matter, many other ethical issues are being discussed in the scientific field. Those ethical issues refer not only their source of provenience and

their moral status, but also their potential use (which opens path for many slippery slope dangers.)

Now, the lack of scientific consensus regarding different aspects of stem cells research and use (from which I will select a few of the most important ones which focus on embryonic stem cells to discuss in the following pages), corroborated with the changing international ethical climate regarding these aspects, makes stem cells a very intriguing and specific topic of ethical discussions.

In this moment, in Ireland, Austria and Italy any type of research that involves human embryos is forbidden. In the United Kingdom, Japan, Sweden and South Korea researches on any type of stem cells are allowed, while in France and Canada only a few types of stem cells could be used for research. (Francis & Finkbeiner, 2006, p. 3)

3. The embryo and its moral status

In order to understand the complexity of bioethical issues related to embryonic stem cell (or even controversial problems), we must look at the obtaining procedure.

The embryos used for obtaining embryonic stem cells are surplus embryos resulted from in vitro fertilization. The embryo production, in the purpose of research, is ethically and legally forbidden all over the world at this moment. Another way of obtaining embryonic stem cells is by creating a stem line through cloning (somatic cell nuclear transfer).

The embryo obtained through any of these sources (the 4-5 days fertilized egg – called blastocyst, at this stage) after a few series of cellular divisions is subjected to obtain stem cells to the following procedure: the external coating made of cells that otherwise would form the placenta is destroyed and the inner cellular mass is isolated. The inner cellular mass is made of stem cells that contain all the genetic information necessary for cells of an entire human being creation and development. If the cellular mass has not been isolated, it would have developed in to three generic cells that belong to the three wide types of germ layers. These layers are: (i) ectoderm (developing the nervous system either central and peripheral, and epidermis, but other cellular structures too); (ii) mesoderm (forming smooth and striated muscles, bone, cartilage, connective tissue, adipose tissue, circulatory system, lymphatic system, dermis, genitourinary system, serous membranes, as well as the notochord) and (iii) endoderm (organizing the stomach, the colon, the liver, the pancreas, the urinary bladder, the epithelial parts of

trachea, the lungs, the pharynx, the thyroid, the parathyroid, and the intestines). (Farzaneh Zahedi-Anaraki & Bagher Larijani, 2011, p. 87)

However, in the moment of harvesting the inner cellular mass (at 4-5 days from fertilization, the stem cells are still undifferentiated, and that is exactly the characteristic that makes them so valuable for the research; in this moment, they have the potency of developing in to any cell of a human body.

After harvesting the cells, they are put in petri dishes with nutritive cells where they will multiply in lines (meaning they form cells of the same embryo) where they can theoretically multiply to infinite.

The specialization of embryonic stem cells will be made depending on the type of stimulus applied in their growing medium. The embryonic stem cells can become any type of cells while the other mentioned types of stem cells cannot do that. The embryonic stem cells can also be retroactively applied, as in the case where the embryonic stem cells were collected before the occurrence of a certain disease.

Their level of plasticity makes them the some kind of magical seed, given the fact that they can grow and develop in almost any type of tissue and it may be possible to help cure to almost every known disease. A few of the discoveries or innovations from modern science have overexcited in such a way the human imagination of researchers, physicians and patients. The potential of stem cells is theoretically infinite, if a way is found to make them working.

However, do we have the right of using these cells, by destroying an embryo? Are embryos to be considered already human beings or just a cell conglomerate? There are various scientific opinions, regarding the moment prior to which an embryo could be used for harvesting embryonic stem cells. It may be the moment of fertilization, the moment corresponding to implantation in the human uterus during a natural event, or further on the moments equivalent to the beginning of developing the primitive streak, the first heartbeat, the development of the brain waves, the first movement of the fetus, the moment when the fetus would survive outside the womb, the birth etc.

The argument that I adhere in this article is the one that we may call "the argument of the 14 days", also known as "the primitive stake stage" (Ford, 1988, p. 173): At the stage of implantation (at 14 days from the fertilization off the egg, when the primitive line cell is formatted) the stem cells start to differentiate in the three germ layers which can organize the

whole organism. Also, at that time, the embryo has developed a primitive nervous system and cannot longer divide into twins. (Ford, 1988, pp. 170-177):

Therefore, I use this argument in favor of the stem cell research, given the fact that at four to five days from fertilization (when embryonic stem cells are extracted for research) the embryo is in a state of blastocyst and has no differentiated cells. Also, at this moment, the embryo has no nervous system and so, should not be considered a human being and either should not be treated by default as a person.

It may be argued that the lack of the nervous system used as a criteria in this argument should not be enough to accept research on human embryos. To that objection it may be answered: if the lack of a functional nervous system is a very good reason in harvesting organs for transplant from brain dead patients, why wouldn't it be also a good reason for harvesting embryonic stem cells from a human embryo? (Landry & Zucher, 2004) One may say that it is not the same thing, that there are some differences between a damaged nervous system (reversible or irreversible) in an organism, and the lack of the nervous system in an embryo, and that the criterion on which this distinction can be made is the capability of developing personhood. A human being with damaged nervous system had a personhood before losing the functions of the brain and the probability of recovering this personhood, while a living being that did not yet developed a functional nervous system never had such a characteristic.

This type of argument may be intriguing, but not sustainable, given the fact that most of the scientific perspectives admit that the nervous system is a necessary characteristic for an organism to have the necessary potency to be considered a living animal or human (the presence of a nervous system is an essential characteristic integrated in the definition of such an organism). This feature, for sure, can constitute an argument in the favor of embryonic stem cell research, considering the fact that before the 14th day since fertilization the embryo has no nervous system.

However, the above idea is not unanimously accepted, some opponents of the embryonal stem research invoking arguments as: "argument from potency" (Schaber, p. 3), "argument from identity" (Schaber, p. 3), "argument from humanity" (Schaber, p. 3), etc., which may be considered also counterarguments to the idea I presented. I will explain, in the next pages of this section, arguments showing why the above-mentioned invoking arguments are not sustainable and why they are not a

good starting point in talking about embryonic stem cells use in research. This are essentially views upon the moral status of the embryo based on criteria such as a potential personhood, a potential autonomy, the potential to develop in to a human being.

Using the “argument of potency”, some may argue that every one of us was in a state of blastocyst, at the beginning of our personal creation. Also, they argue, the embryo (in any stage of development) has the potency of developing into a human being, a reason for which an embryo must be both treated with respect and protected, even in an early stage of development (as it is the case with the embryo in a stage of blastocyst.) (Schaber, pp. 7 - 9)

The problem with such an argument is that although an embryo may have the potency of becoming a human being, this does not imply the necessity of being treated as a human being, because without the implantation in a woman’s womb it will never reach his potential to become a person. Moreover, even if it would be, the possibility of an embryo obtained by in vitro fertilization to become a delivered fetus after a pregnancy is low. According to our current knowledge, more than a half of fertilized eggs are lost from natural causes before implantation – so this type of loss (by harvesting stem cells) could be assimilated to a natural loss.

Another aspect regarding a presumed right of using embryonic stem cells in research may be in fact that there is not a precise moment when a fertilized egg transforms in a fetus because is a continuous process in which we have not yet identified the exact moment of an embryo becoming a human being. In scientific terms, the counter argument for the above commentary may be rather simple (as I previously argued using the argument of the 14 days), but not without controversy: as long as an embryo has no nervous system it has no capability of thinking, feeling pain, experience feeling or even the wish to live.

One of the arguments that are invoked in talking about embryonal stem cells research is the “argument from identity”: if indeed a full developed person’s DNA is identical with one of an underdeveloped embryo, isn’t there the same person? (Schaber, pp. 3 - 7)

But that argument does not stands in this context for two reasons: first, at 4-5 days from fertilization it is not sure how many embryos will be divided - it could be one, or more than one, so the answer is no, it cannot be assumed that a specific blastocyst would be the one and the same with a

later developed human being. The second reason would be that the human DNA is not the only definitory characteristic of a human being:

”One might of course say that the story of a person started in a way when he was conceived. This is correct if what is meant by that is just the fact that the development of his body can be traced back to his conception (there is a causal story to be told here about the development of his body). But that does not mean that Norbert was already there when he was conceived. His essential properties came as a matter of fact much later into existence: His character traits, his thoughts, his projects, his interests etc. Thus, Norbert is not identical with his early embryo, despite the fact that the development can be traced back to the moment he was conceived.” (Schaber, p. 5)

Other argument usually invoked by those who disagree with use of stem cells for scientific research purposes on moral status ground is the “argument from humanity” or ”based on a biological humanity criterion” (Steinbock, 2007, p. 417): a human being has a value in itself, in any stage of development and therefore, a right to live. This, I may argue, is not indeed a well-founded ethical problem, given the fact that the embryo used for research are surplus embryo that will be nonetheless scattered: if not used in research purposes, they will be discarded. In consequence, these embryos will never become human beings in any scenario.

We assume that although it has no human dignity, the human embryo deserves some special form of respect, due to its origins of provenience. As some authors would argue, we owe something to it (some form of moral reverence) because is a form of human life. (Schaber, pp. 12-13) Although it has no right to live that we must preserve, the moral consideration that we owe to it in virtue of its potency to develop properties specific to human being, would entail a duty of not killing it without any good reason (Schaber, p. 12) like for producing greater benefits than a simple damage. Therefore, although it has no intrinsic value of its own, a human blastocyst has an inherent value (Schaber, p. 12), based on its provenience, and although it cannot be sustained that he has a moral status of its own, he has nonetheless, indisputable an intrinsic moral value. (Steinbock, 2007, p. 417) This is the reason only the spare embryos can be used for embryonal stem cell research and for the fact that cresting embryos for such research purposes is prohibited worldwide.

This idea of moral value instead of moral status will occur repeatedly on this article because I strongly believe that viewing the embryonal stem cells research on this framework would put an end to the most of the ethical dilemma that we are confronting now on this matter.

But when does an embryo gain the moral status of a human being?

Most of the authors discussing this issue argued that identifying the right moment when an embryo becomes a fetus (a human being) is the key moment for setting boundaries regarding the moment when an embryo can be used in research. Similarly, we can estimate when an embryo should be treated with a type of respect specific to a human being, in virtue of his dignity. Most of these authors argue that the human dignity begins in one of the following moments: conception, primitive streak development, implantation, ensoulment or birth. (Farzaneh Zahedi-Anaraki & Bagher Larijani, 2011, p. 87)

Although there is no unanimous (cultural or religious) consensus regarding the moment in which the human life begins, and therefore regarding the moment when the entitled moral status is gained, the science and the researchers particularly should pay a close attention to all human's religious faiths and cultural believes, given the fact that such a research should have some universal results, from which every single person should benefit. Ignoring these concerns would equally provoke a direct harm or a prejudice to different religious or cultural groups, by disrespecting their personal beliefs.

Nevertheless, I may argue, it should be understood without saying that the human embryo used for harvesting stem cells should be treated with respect in virtue of its origins of provenience as any other human genetic material, but not only in virtue of its potentiality to become a human being, but also for respecting the dignity of the donors. That is why, I think, there must be very rigorous procedures for informing the donors, for obtaining their voluntary and informed consent as proceeding in research with well-established procedures agreed by entitled competent committees of research ethics.

Another way of looking at this problem would be if we would accept that we have a duty to humankind to reduce and prevent pain and suffering. However, would that moral duty justify the research on embryonic stem cells? If so, would that make immoral or less moral the use of these stem cells for beauty treatments (as rejuvenation treatments or other type of beauty treatments)?

Here, we may say, we have a conflict of duties: we have a duty of prevent pain and a duty to protect human life. (Hug, K., Embryonic stem cell research: an ethical dilemma, <http://www.eurostemcell.org>). It may be argued also, that failing to take the best measures to assure preventing death and suffering – as it would be, for example, encouraging embryonic stem research – it will be the same (equal with) failing to save millions of lives or with prevention of suffering people of being cured.

Therefore, as I said above, one of the major dilemmas raised by the embryonic stem cells is that between two moral duties that we have in virtue of our human nature: the duty to prevent suffering and the duty to respect human life. (Hug, K., Embryonic stem cell research: an ethical dilemma, <http://www.eurostemcell.org>). However, is this a real dilemma? Some would say yes, some would say no. Why is that? All depends not on the foundation of this duties, but on their application to this particular case of stem cells, and that it would be a difficult mission given the different understanding of the concept of what makes a human being a human being (or when the human life of an individual begins), as I argued above. That moment will vary so much in some perspectives, other than scientific, that may be considered outstanding. Take, for example, religious perspectives, where the moment in which a person is considered a human being varies from the moment of conception to a child's first cry or even a few months after birth. (Francis & Finkbeiner, 2006, p. 4)

4. Embryos obtained by in vitro fertilization as a source of stem cells

I will move my thesis further, using two of the ethical theories and a method of ethical decision-making to prove that the research on embryonic stem cells and their proper use in therapy is not only moral, but also a duty that we owe to ourselves, to humanity and to future generations.

After covering general grounds of the arguments specific to theories, I will try to enumerate the major slippery slope dangers that may rise from embryonic stem cells research, followed by a series of arguments on why we must overcome these dangers.

Therefore, I must conclude upon a few ideas discussed in the previous pages, ideas that had proven to be more sustainable than others:

Research of embryonic stem cells is morally permitted and in the same time desirable in the context of using spare embryos of 4-5 days from IFV (or cell lines derived from such a spare embryo), and it would not mean

killing a human being given the fact that only after 14 days embryo begins to develop a nervous system, and it cannot be divided into twins, and also, given the fact that otherwise the embryo would had been discarded.

Given these facts, along with the argumentation previously presented, I will try to verify if embryonic stem cells would be morally justifiable using frameworks as: deontology, utilitarianism, and ethical decision-making principlism. Although I have already assumed some facts (as the fact that a blastocyst is not to be considered human being), I will try to be careful in verifying these arguments through ethical theories) to highlight in which way the religious and cultural beliefs could not be harmed, but respected and valued.

First of all, from a deontological perspective (which is a non-consequentialist theory, unlike utilitarianism), the fact that embryonic stem cell research would be able to produce results that can provide treatments and cures for almost any disease – as consequence – does not value anything. In a kantian sense, if we consider the embryo in the stage of a blastocyst just as genetic material, that we should be treating it with respect as any other extension of the human body, for not affecting the dignity of the donor. It is not indeed very clear if a blastocyst would be counted as a person in kantian theory and this is a very disputed issue, but given the fact that in Kant's moral philosophy human dignity is strongly linked to autonomy that is a key condition (a fundamental condition) for any moral agent, I would say that the philosopher wouldn't consider an embryo in a stage of blastocyst as a person. In Kant's theory, any living being without autonomy (such as animals), with diminished autonomy (as children), or with damaged autonomy (as mentally ill individuals) is a part of a special category of which the author does not speak too much about.

Now, embryos clearly have no autonomy, so their instrumental use (treating them only as means to a purpose) would not be wrong. In this case, the categorical imperative through which we are said to:

”Act in such a way that you treat humanity, whether in your own person or in the person of another, always at the same time as an end and never simply as a means” (Kant, 1993, p. 36)

would not be violated, given the fact that the preimplantated blastocyst is not considered to be a person.

More than that, I would add that, we - as moral autonomous agents - have the moral duty in a kantian sense to preserve life. And that, although it

might seem counterintuitive at the first sight, does not mean to preserve the life of the embryo, but to preserve and to prolong the life of human beings such as yourself, and those as yourself, by developing cures and treatments as a result of our knowledge deepness by embryonic stem cells research. If the embryo would be understood as a human living being and not as an extension of a donor, using embryonal stem cells would be terribly wrong, and would be killing, so, for setting a right course of actions, every surplus embryo should be either infinitely frozen, either implanted. But being understood as a property of some donors, refusing them the right to donate their spare or surplus embryos resulted from IFV may be one and the same thing with violating their autonomy.

On the utilitarian ground, using embryonic stem cells for research would as well be a moral action. Given the fact that utilitarianism is a consequentialist theory and assuming that the embryonic stem cells research would be for the greater good, using embryonal stem cells will promote utility for the greater number of people, and that would make embryonic stem cells research a moral action. This is indeed the case, I would argue, because, on this ground, promoting cures for dreadful diseases and taking steps for promoting sanity for the many is a reason enough for encouraging this type of research.

Another way of thinking at this matter would be through principlism, which is the most appreciated and used approach in bioethics, framework that is developed by Tom L. Beauchamp and James F. Childress.

These authors formulated in their book "Principles of Biomedical Ethics" four principles, which became a method of decision making, from that moment on, applicable to the majority of problems discussed in bioethics. These principles are: respect for autonomy, non-maleficence, beneficence and justice.

Regarding the first of the enumerated principles, an autonomous person is an individual who can deliberate regarding his goals and his best interests, and who can decide for himself after this deliberation, being capable of setting a course of actions and being able of putting into action. (Beauchamp & Childress, 2001, p. 58) Respecting the significance of someone's autonomy will therefore mean to allow and not constrain a person in his act of deliberating and deciding. (Beauchamp & Childress, 2001, p. 64) There are, however, persons with diminished autonomy that cannot take care of themselves, and cannot deliberate in accordance with their own personal plans and desires. (Beauchamp & Childress, 2001, p. 58)

In domain of scientific research, autonomy principle reflected is in the informed consent procedure in the scientific research domain requires that the participant both must be fully informed and voluntarily accept to participate (voluntarily meaning without any constraint and as an expression of his own will).

In the case of embryonic stem cells obtaining and use for research the problem of respect is very sensitive, because of its dependence on accepting or denying the status of human being for an embryo. But, whatever the answer may be, one thing seems to be clear: embryos and embryonic stem cells cannot be informed properly and cannot express their voluntary consent. Accordingly, the mandatory informed consent must be obtained from the donors or donor tutors. The autonomy of the donors must be respected and stem cell from their surplus embryos being harvested only if that is their wish, and had consented to it without any constraint. The second principle, non-maleficence implies not to inflict harm or prejudice, and also to prevent and remove harm. (Beauchamp & Childress, 2001, p. 114)

Principle of beneficence refers to the ethical manner in which a person should be treated, making efforts to protect them from harm, and to secure their wellbeing.

In the research domain, these two principle, non-maleficence and beneficence principle are directly reflected in the risk-beneficence analysis and minimizing risks for participants obligations while maximizing possible benefits. For that matter, every researcher or physician who enterprises an action that involves a human being, must evaluate directly and indirectly the benefits of the research, and also the potential harms, prejudices or discomforts.

Sometimes, evaluations regarding the potential harms may seem very delicate and difficult: researchers have the obligation to consider the cultural and religious convictions of the population involved in research, directly and/or indirectly, and to avoid producing harm including by tangential touching of their convictions if that can be a prejudice to them. Not integrating their personal beliefs in the cost-benefit analysis would be as treating them with disrespect in terms of their religious and cultural beliefs, given the fact that the scientific research – as a global enterprise of the humanity – regards every human. (Francis & Finkbeiner, 2006, p. 5)

Among potential harms or slippery slope argument related to beneficence principle (or to non-maleficence), the researchers must include

the presumptive use of techniques or objects researched (as the reproductive cloning), and to evaluate the risks associated with this. (Francis & Finkbeiner, 2006, p. 6) I will return to this matter, arguing that such concern shouldn't be enough to stop research on embryonal stem cells, and that almost any of the slippery slope risks can be avoided or controlled through a good knowledge of ethical conduct in research.

The last principle, the justice principle, refers to fair distribution of benefits and burden at any moment of the project (results, research program, etc.), without excluding none of the persons. Benefices under discussion can be direct (resulted from direct participation, e.g.: experimental treatments) or indirect (resulted from successful development of new treatments, e.g.: cures).

According to this principle, nobody can be arbitrary or discriminatory excluded from research participation (direct benefices) and everybody should have access to the research results and developed treatments, without any arbitrary or discriminatory restraint (indirect benefices).

Some of the slippery slope arguments are related to this justice principle:

What if, some wonder, only the reach or influential people will have access to those treatments? That wouldn't be the first time when such a situation is encountered in our society. That in fact, I think, is one of the questions that put under attention the greater risk: what if the humanity is not prepared for this technology? What if we misuse it? If we address the problem in this manner, the counterargument would be a very simple one: would we ever be ready for it? And if the answer is yes, how will we know it? And how we know if that moment isn't right now?

Fear is not an answer. Not when it comes to science. Precautions are, indeed, needed, but not fear. We must take all the predictable risks into account, measure them and see if the potential benefices would be greater than the risks. This type of cost-benefice analysis, which I mentioned above at the beneficence principle, would give a straight answer to this hypothetical question: would be the benefice of curing almost every disease of anyone a benefice greater enough the risks that these treatments will be kept only for a small group of people? I think that everyone's answer would be "yes", not only for a greater benefit assumed, but also for the fact that any potential risks estimated should come together with some plans of minimizing the risks, and with solutions of reduce their possibility of occurrence.

But what if, others may wonder, investing the necessary amounts of resources into embryonic stem cell research would be in vain, and it will be proven that such huge amounts of resources were in fact scattered instead of investing them in some more realistic clinical research? For this, I will argue, there is need to prioritize the resources. This is one of the most problematic slippery slope dangers in my opinion. Would be very nice that we would have enough resources for everything, but this is not the case. In this matter, the justice principle would be respected if every person needs and opinions would be taken into consideration.

One of the most worrying procedural problem with embryonic stem cells is that until now it did not produce real results. But I think that with more knowledge, with more effort and more research work, we could accomplish much more than running from our responsibility by the fear that so many things may happen if we proceed in such a journey.

We, as human individuals, as part of the human species, are in perpetual evolution in the Darwinian understanding of evolution: we adapt, we modify our environments, or way of living, and our body and mind are also modifying to adapt: the fact that we interfere on the way the nature works, as some who are afraid of slippery slope danger may say, means only that we take a natural step forward, a big leap, you may say, but not an unnatural one, because we are always on an attempt to improve. And, to those who argue that interfering with the natural way of being is wrong, I would ask: why would be this interference any greater than other medical improvement or discoveries has been? Wouldn't then be surgery as immoral as treatments with embryonic stem cells?

One of the slippery slope risks encountered regarding embryonic stem cells research may be that if we accept therapeutic cloning for embryonic stem cells research, then it remains only a small step to accepting reproductive cloning.

I agree that when researching on humans or on human material we must be extra careful and have a rigorous set of rules for not allowing even one single unethical or dangerous action to happen. But I also think that we must not be blinded by impossible dangers, avoiding evolving for this reason: there is not a clear connection that can be made between therapeutic cloning and reproductive cloning, or, at least, not one that should prove how one emerges from the other.

Some will say that if we allow therapeutic cloning we will create the perfect circumstances for scientist to push forward the boundaries of science and to create new human beings through human reproductive cloning.

The answer to this concern is the following: not the procedure itself would be the problem in that situation, but the way that scientist will comply with moral norms! So, once we identified from where the real risk may come from, we can forward to solution, which is a very simple one: for every single research projects that imply human genetic material there must be an ethical evaluation made by an ethics committee composed by competent members. Also, scientists that create such experiments should have in their academic history ethical trainings that should help them develop a proper ethical conduct of their work and in every research institution or organization should exist a research ethics committee (institutional review board) with members qualified in research ethics for evaluating and monitoring research projects. Those committees should work respecting and promoting national and international research ethics regulation. Ethics should keep up with scientific progress; that is the main idea. Although science might have such a rapid evolution that no ethical framework can foresee, we should always have the means to correctly understand the ethical implication of the scientific discoveries.

Also, as I argued, for respecting the ethical principles, every person should be listened in this matter, whether they agree with embryonic stem research or not. I know that there is no way to accomplish all the demands at once, but everybody's opinion must be listened and understood in this matter, although the decision should be taken in the interest of all human kind and humanity as a hole, in a utilitarianism sense.

5. Concluding remarks

As I previously argued, I think that we have a duty to seek treatments and cures to dreadful illnesses. I think it is our duty to create a new prospect for elders and injured or suffering people: caducity without major suffering, without Alzheimer and other degenerative illness. I also think that we owe it to the next generations a medicine that can prevent suffering, that can repair handicaps, and that can be in everybody's benefice. I demonstrated in chapters 4 and 5, that those two duties (to cure diseases and to pass on to future generations the knowledge for a better life) are not conflicting with the duty of respecting and preserving human life as long as stem cell research the we are conducting are made under specific conditions.

Those conditions are: research on embryonic stem cells should only be done on surplus embryos of 4-5 resulted from in vitro fertilization that otherwise would be discarded that were donated freely and voluntarily by owners; also the research should be conducted of medical specialist that are also trained in ethics, and with a complete knowledge of all the potential risks. The researches must be conducted under the careful supervision of the ethics committee.

Research on embryonic stem cells effectuated under these conditions, the slippery slope dangers mentioned should not count as obstacles that are capable of obstructing the scientific progress, but as manageable or avoidable risks. We must understand that new such slippery slope dangers will arise with the scientific development, and that the higher is the scientific discoveries, the higher the potential slippery slope that will arise. That is why we must be educated to foresee and prevent the potential risks, and simultaneously encourage scientific development.

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