The ethical aspects regarding cryopreserved embryos

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Abstract: The development of assisted reproduction technologies (ART) has given millions of infertile couples worldwide hope to accomplish their dream: having children. In most cases, however, more than one embryo results. By the means of cryopreservation techniques, the excess number of embryos are kept until the family has completed the number of children they wished for. The ethical major issues arise when deciding what will happen with the surplus embryos, that have remained cryopreserved. The couple can either opt for disposing of the embryos by thawing them or engage in compassionate transfer, donate them for other couples or give them for “adoption”, otherwise donate them for research. Some couples simply “abandon” the embryos. This is a very sensitive subject, as embryos are not only transplant tissue, but they have the potential to generate the life of a new human being. The principles of bioethics must be taken into account in every of the above decisions mentioned: respect for autonomy (the respect for the capacity of the person to choose), non-maleficence (avoiding harming), beneficence (the care for the well-being of the person), and justice (the equitable distribution of benefits and costs). There are specific laws that must be respected as well as in making the decision, laws stipulated by the Societies of Human Reproduction and Embryology, by the Declaration of Human Rights and by different Civil and Penal Codes available, that differ from country and state worldwide. The Christian Religion believes are surrounding this controversial field as well, while the medical researchers emphasize on the tremendous potential the embryo stem cells have on curing disease such as cancer, genetic disorders and infertility. This article presents all these aspects compassing human cryopreserved embryos and give a full picture over this subject, that one finds extremely thrilling, meanwhile some find it disturbing.

Key Words: cryopreserved embryos, bioethics, embryo donation, embryo stem cell research, destroying abandoned embryos.

INTRODUCTION

In vitro fertilization (IVF) is one of the most important technique of human assisted reproduction for achieving a pregnancy. IVF consists in collecting oocytes from the female, fertilizing them in vitro with spermatozoa, subsequently the embryos are cultured up to day 3 or 5 and then transferred. As the purpose is to give the couple the maximum chances of conceiving, several ova are collected and fertilized resulting in several embryos. Typically, one or two embryos are transferred at a time and this results in cryopreservation of the embryos remaining, as “back-up” if the previous transfers are unsuccessful. According to the “Revised guidelines for good practice in IVF laboratories (2015)”, Guideline of the European Society of Human Reproduction and Embryology (ESHRE): “11.6 Supernumerary embryos may be cryopreserved, donated to research or discarded, according to their quality, patient wishes and national legislation” [1].

While the accurate number of frozen embryos is unknown due to lack of reporting requirements, in 2013,
for example, it was estimated that there were more than 1,400,000 in the US and in 2011 more than 840,000 in the UK [2, 3]. This comes with the big ethical problem: after the couple completed their family, what will it happen with the remaining frozen embryos?

**OBJECTIVES**

The purpose of this paper is to survey the major ethical issues regarding the future of the cryopreserved embryos. IVF poses financial, physical and emotional stress on the intended parents, that they accept and admit on the behalf of accomplishing the dream of having a child. But in the excitement of having children, many individuals often over-look questions regarding “left-over” embryos, that raises more and more controversy worldwide.

**MATERIAL AND METHODS**

This paper is a complex review of the literature that analyzes the ethical implications involved while dealing with cryopreserved embryos. We present and synthesize the different medical options for the cryopreserved embryos from the speciality worldwide speciality literature, while having as a background for each option the bioethics principles, the worldwide legislation available in the IVF field and the point of view of the religious associations. Even if the cryopreserved embryo theoretically belongs to the couple that has created it, the decision about its fate is under different legal jurisdictions according to the country where it was formed, so we summarize and present here some aspects of the Penal and Civil Law in the Health Care Systems and of The European and American Human Reproduction Societies, integrating a critically analysis of the religious implication as well.

**RESULTS AND DISCUSSIONS**

Once a couple has completed the family that they have dreamed about, usually a number of cryopreserved embryos remain, and the question now is what are the options for these embryos, and which one is the best to opt for: destroy them; donate them to medical research; donate them to an infertile woman; keep them frozen; and engage in compassionate transfer.

The ethical and legal debates around this subject have two main directions: one is regarding the right stipulated by law that “every person has the right to reproduce” [4] and the other is “every person has the right to life” [5]. Even if abortion is legally approved in most of countries worldwide, this meaning that the embryo is not considered yet “a person”, implying that the cryopreserved embryos are in the same category, there are a lot of voices disagreeing, especially for religious reasons, for example in countries like Romania, where 87% of people are religiously affiliated to the Romanian Orthodox Church [6]. The debate starts when considering the interpretation of the main basic four Principles of bioethics: respect for autonomy (the respect for the capacity of the person to choose), non-maleficence (avoiding harming), beneficence (the care for the well-being of the person), and justice (the equitable distribution of benefits and costs) [7].

Firstly, the option to destroy the remaining embryos is not an easy decision for the couple. Many couples, after having the number of children they wish for, do not want to pay indefinitely the annual fee for embryo storage. Some of them do not want to have these cells, that they consider their “off-springs”, going to some other couples or offering them for research. In conclusion, they opt for the simply disposal of embryos. Or, they just do not pay the storage fee anymore and stop any contact with the fertility clinic, “abandoning” the embryos they created, and without a legal agreement to do otherwise, the clinic must remove the embryo from the nitrogen liquid, thaw it and allow it to be destroyed in the process. “It is ethically acceptable for a program or facility to consider embryos to have been abandoned if at least 5 years have passed since contact with an individual or couple, diligent efforts have been made to contact the individual or couple, and no written instructions from the couple exist concerning disposition (…) in no other case should the embryos deemed abandoned to be donated to other couples or be used in research” [8]. As doctors, we may perceive this as a waste, both for the benefit of other infertile couples or for the evolution of medical knowledge by means of research and development of therapies that may lengthen lives. But this approach respects the principles of ethics, mentioned above, that must be respected, particularly the right to autonomy. Worldwide there is a red flag, the reproductive societies such as American Society for Reproductive Medicine (ASRM), ESHRE, Canadian Fertility and Andrology Society, insisting the clinics should have a contract from the beginning of the IVF procedures, stipulating what should happen to the embryos the couple will not use. More than from an ethical point of view, this will protect by a legal basis the clinics, making everything clear from the start what are the couples wishes in case of failure to pay the storage fee, divorce, separation or death of the "parents".

The ethical part that many associations worldwide, especially religious ones, are critical about, is that the destroying the unwanted embryo in similar to "killing" a person. But, first of all, we must remember the definition of a “person”. This will have a major importance in all the ethical discussions subsequent in this article. A person is a being that has consciousness, self-consciousness, sensitivity to pleasure and pain, and/or rationality [9]. Until 14 days post-conception, the
nervous system has not even started to develop. Embryos it is clear that embryos are not conscious [10, 11] - most studies affirm that the onset of fetal consciousness is after 24 weeks [13-15]. Nevertheless, embryos also cannot experience pleasure and pain - this ability is proven to appear after 16 weeks of gestation [11, 15-17]. In addition to this, they are certainly not self-conscious or rational, as self-consciousness does not develop until late in pregnancy or after birth, and rationality, of course, develops much later [18, 19]. In conclusion, one cannot state that embryos are persons. Of course, they must be respected for the potential of becoming one, so we cannot refer to them just like to any other transplant tissue, but nor can one say that they are similar to a real person.

The second option regarding cryopreserved embryos is embryo donation. First of all, what are the legal aspects concerning embryo donation? According to ESHRE, embryo donation is “allowed in 15 of 27 EU Member States (UK, FI, LV, CZ, HU, RO, GR, NL, BE, FR, ES, PT, EE, SK, BG), forbidden in 7 of 27 EU Member States (IT, DK, SE, AT, DE, SI, LT) and not regulated in 5 of 27 EU Member States (IE, LU, PL, CY, MT)” [20]. But how will this donation take place? There are two possibilities: by “embryo adoption” or “by embryo donation for financial compensation”. “The financial compensation is foreseen in 12 of 20 countries (not forbidden means allowed + not regulated). In Romania, every kind of reimbursement and financial compensation is forbidden” [20, 21]. As Romania does not have a specific legislation for MAR (medically assisted reproduction), but this field is under the jurisdiction of the national cell and tissues transplant laws, it is logically that no financial compensations for the donors is allowed, embryos being considered just like any other tissue for transplantation [21, 22]. There are some legal issues surrounding the terminology adoption and donation [23]. The term “adoption” is better seen by abortion-rights groups because it encourages people to view the frozen “spare” embryos as equivalent to children. The term “embryo donation” is a more neutral term, equivalent to “transfer of genetic material” from one party to another. But, legally speaking, the term “adoption” raises numerous issues. For example, a case at The Supreme Court of Tennessee named Davis vs. Davis (1992) suggested a framework for resolving similar disputes in the US afterwards. It stated that “semantic distinctions are significant in this context because language defines legal status and can limit legal rights” [24]. Secondly, what are the religious concerns over embryo donation? Because in Romania the Orthodox Church has a major impact over the religious concerns over embryo donation? Because in this case the time-honored ethical principle “rule of the lesser evil”, meaning that facing a complex situation, with two possibilities that someone both find to be immoral, it is better to choose the “lesser evil” one. In our case: to let the embryo to thaw just because it is “nonmoral” to implant it in another woman, or to “save” it by accepting the adoption? In the USA, for example, there exists this approach from the Church. An organization, named Nightlight Christian Adoptions [26], deals with embryo adoption similar to a traditional adoption program, offering education to both parties involved, counseling and help with the emotional, legal and financial aspects throughout all the process of adoption, considering the embryo as a precious child and not as a genetic material. This is in the USA the “Christian” way to approach the problem of excessive embryos, and maybe the Romanian Church should take a moment to think about this kind of support that could be offered to the people, instead of stigmatizing them for wanting to have a complete family.

So, after considering destroying the embryos is a waste for other infertile couples that could have used them, and considering the Christian Church does not agree with discharging the embryo, is embryo donation ethical? Taking into account the principles of bioethics: respect for autonomy (the respect for the capacity of the person to choose), non-maleficence (avoiding harming), beneficence (the care for the well-being of the person), and justice (the equitable distribution of benefits and costs) [7], all of the above are respected. This is a grey way to ensure the embryos the “parents” so much worked for will be brought to life, and nevertheless, will make happy a struggling couple. In addition to this, depending on the country legislation and the “parent’s” wish, there can be stipulated in the contract of donation and embryo adoption that a kind of contact between the two parties that will be kept over the years, so the donors will know about their quality of life. So, the embryo donation respects and preserves human life.

The third option for cryopreserved embryos is for them to be donated for medical research. The legal aspects for donating the embryo for this purpose are the same as stated in the embryo donation section above [20-22]. The international reproductive societies commissions and the European Group on Ethics in Science and New Technologies developed supplementary legal and ethical basis for embryo research, so that research will be in line with applicable international, EU and national law. For example, in the Guidelines for the Horizon 2020 program, it is clearly stated that it is not allowed “the use of human embryos for research activities directed at human cloning for reproductive purposes, research activity intended to modify the genetic make-up of human beings that
could make such changes heritable (apart from research relating to cancer treatment of the gonads, which may be financed), research activities intended to create human embryos solely for the purposes of research or stem cell procurement, including the technique of somatic cell nuclear transfer, research that leads to the destruction of human embryos”[27]. Even if by the religious concepts mentioned and explained above one can conclude that the Christian Church does not agree with embryo research, the ethical principles are well met and reassuring. The potential use of embryo research is tremendous. This may lead to development of therapies that will lengthen lives, save people from different sufferings and treat infertility as well, meanwhile reducing the need to conduct potentially harmful experiments on animals and people. Embryonic stem (ES) cells are totipotent or pluripotent cells that could be induced to form tissues and organs in vitro for transplantation [9]. Worldwide there is a constantly high need for transplant organs, many people's lives depending on the waiting lists. The use of ES could improve the number of people receiving organs and in the same time improve the transplantation success rates, by producing tissues that will not be rejected by the recipient cells. In addition to this, the fact that grafting ES cells is a potential non-toxic anti-cancer treatment it is an astonishing finding that must be further studied [9, 28]. This devastating illness has a major impact on thousands of people's lives, developing at younger and younger ages. This area of interest rises hope for oncology patients, children, adults and elderly, for their families and loved ones, and for the governments, as cancer has a great emotional, financial and social impact. Finally, ES cell research may help the development of infertility treatments and provide information about congenital diseases and causes of miscarriage as well.

Based on this information, is embryo research ethical? The respect for autonomy, non-maleficence, beneficence, and justice [7] are provided? As we can consider that there are millions of lives that could be saved by these means that offer extraordinary medical possibilities, and that not saving those people from suffering and death could be morally equivalent to “killing” them through inaction, what is the "lesser evil"? Performing research on embryos, that we demonstrated above that cannot be considered equivalent to “a person”, or allowing real human beings, real persons to have a fate that could have been avoided? The “beneficence” highly outstand the “maleficece”.

The forth option for the cryopreserved embryo is to engage in compassionate transfer. This is a process where the remaining embryos are transferred into the uterus of a woman when it is highly unlikely to result in pregnancy, without any treatment beforehand. Some may consider that this procedure is less morally problematic than intentionally destroying these embryos or leaving them frozen indefinitely, as it may seem a more “natural” way - the miscarriage compared to an intentional destruction of the embryo. Some state that adopting this decision is a sign of the “autonomy” principle of bioethics. But, when there exists an alternative that will provide greater good, or when the consequences do not outweigh the benefits, then autonomy may be limited [29]. Many consider that the practitioners should use their time and medical resources in a better way than providing this service just for the embryo to have the possibility to “natural pass”. Because this procedure is not medically necessary, not a lot of clinics offer this service. Even if the “non-maleficence” aspect is preserved, the ethical principle of “beneficence” or “justice” are not met either, as this procedure does not provide any benefit, the intention and purpose of it being just an alternative way to dispose of the embryo.

CONCLUSIONS

The assisted human reproduction field has a lot of controversy regarding the legal, ethical and religious aspects that includes. Taking into account there are still a lot of debates surrounding the area of cryopreserved embryos, one must always take into account that the basic principles of bioethics: respect for autonomy (the respect for the capacity of the person to choose), non-maleficence (avoiding harming), beneficence (the care for the well-being of the person), and justice (the equitable distribution of benefits and costs), but there must be stipulated clear legal grounds for all procedures involved, for the safety and serenity of both the patients and the doctors. The embryo is not considered as a full-righted person, but it is entitled to greater respect than any other transplanted tissue for its biological potential. There is more than one possibility for the “parents” to option regarding how to deal with their excess embryos after completing their family, either by destroying them or keeping them frozen, donating them to other couples or for research or trying compassionate transfer. Even if the couple that has created the embryos has the right to choose which option they feel more comfortable with, as medical doctors, we must explain them the importance of doing what is best for them, but to take into account the bigger picture as well, regarding what could one do for other couples as well or for the development of research. We hope that by emphasizing the “beneficence” concept, we could help the improvement of treatments, alleviate suffering caused by different diseases or help other infertile couples accomplish their dream family.

Conflict of interest. The authors declare that there is no conflict of interest.

Acknowledgments

All authors have equal contribution in writing this paper.
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