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Considering the safety of embryonic stem cells for medical use while ignoring any ethical concerns: a review

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Abstract

The use of human embryonic stem cells has been the subject of growing amounts of legitimate research in recent years. Yet, the morality of these investigations is contested by a variety of current arguments in legal and ethical philosophy due to the harvesting of stem cells from the non-implanted fetus. This review focuses on one side of the issue, namely the therapeutic value of these cells, and glosses over the other sides, which include concerns about ethics and patient safety. It makes the case for evaluating embryonic stem cells as a way to rethink how we treat some of humanity's most intractable ailments. Yet, patient safety remains a challenge for this emerging biotechnology and the ethical and public policy implications of this need to

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be carefully considered. The perennial conflicts over the moral validity of embryonic life may be lessened if researchers explored different approaches. Consequently, the issue may be resolved by extensive scientific study in the future with appropriate clinical applications.

Keywords: Ethical concerns; embryonic stem cells, stem cells, biotechnology.

Introduction

There has been significant development in biotechnology with human embryonic stem cells (HESCs) during the past two decades (1). This breakthrough ranks among the most important discoveries in biomedical research in the last few years, the last century, or the last several decades. Human embryonic stem cells (HSCs) may be extracted from embryos that haven't had implants placed in them; these HESCs have the potential to learn and differentiate into various cell and tissue types (2). The great majority of the world's biomedical scientists have used this for their own research and medical objectives, and it has also garnered public interest as a potential therapeutic option for intractable and chronic illnesses (3). These advances, however, may spark discussions about the morality of fetal cell harvesting and the importance of patient life safety in medicine (4). Some well-known or well-reported cases include campaigns to make it permissible to utilize human embryos in scientific experiments.

Due to their unique biological features and the ease with which they can be mass-produced in the lab, ESCs have emerged as a promising technique in the field of regenerative medicine in

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recent years (5, 6). This hope has been achieved in the investigation of fetal anomalies, and a new path in regenerative medicine has been prompted by advances in pharmaceuticals (7, 8). If ESC research is allowed to continue, then the argument may be made for or against the claim that the benefits exceed the risks to the fetus and ethical concerns raised by the research. Nonetheless, it is said that one of the clearest indications that isolation is moral is the persistence of investigations on this particular cell (9, 10). Both supporters and detractors of ESC research have expressed concerns about violating the sanctity of human embryonic life (11). The goal of this study is to examine the debates around the use of human embryonic stem cells (ESCs) in medicine, including the possible ethical, health, and economical repercussions of doing so. The potential of ESCs as sources for other cells and tissues in the human body, as well as their prospective advantages for research into several incurable and chronic illnesses including heart disease, Alzheimer's disease, and diabetes, are discussed. The most prevalent changes that lead to mutations or cancer cells during embryonic development will be discussed.

Background

One of the most important biotechnological discoveries of the twentieth century was reported in the American academic magazine Science (vol. 282) in 1998. Embryonic stem cells (ESCs) from a human fetus were reported to have been harvested and cultured (12), despite laws prohibiting the use of government funds for research on human embryonic fetal

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tissues. Thomson et al. oversaw the creation of ESCs by using a commercial corporation as the biological research institution to sidestep NIH regulations (13). A novel approach to human organ tissue engineering was investigated in this study. The key accomplishment of obtaining ESCs from human embryos is seen as a step toward the future of replacement treatment, even though ESCs had been acquired predominantly from mouse embryos since 1981. (14). Nevertheless, (15) contends that the controversy surrounding ESC research begins with the separation of ESCs from human embryos between 72 and 120 hours of development. So, the investigation started with the question of whether or not it is moral to destroy a human embryo to extract its stem cells for use in medical research and therapy. Growing political, moral, and social debates have been sparked by the use of human embryonic stem cells, according to (14). The study also uncovered a variety of ethical disputes on both sides, as well as disparities in religious perspectives and the ability to grasp the essence of human ESCs from an early stage in fetal development. In particular, the use of human ESCs raises ethical questions because of deeply held moral principles like the sacredness of life (16). The existing inadequacies in our knowledge relative to the safety of patient life, as stated by (17), further complicate the dilemma of HESCs (18). According to (19), British law from the 1990s states that for a certain study on human embryos to be approved by the Human Fertilization and Embryology Authority (HFEA), the researchers must show that the study is necessary or qualified for one of three purposes: (1) advancing the

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cure for infertility; (2) investigating the causes of most congenital disorders or the reasons for abortion; or (3) promoting more effective methods for preventing fertilization or discovering abnormally preferable Whether or not unspecialized ESCs should be used for replacement therapy due to the risk of their carcinogenic transmutation has been a point of contention in the field of regenerative medicine since 2004. This is because periodic verification of embryonic stem cell lines should be based on their genetic stability (some embryonic stem cells are converted to cancer cells through mutation of their genes). Human embryonic stem cells (ESCs), which may have enormous significance for the development and differentiation cells to become more suited for therapeutic transplantation, will be the primary focus of most efforts (14).

The use of embryonic stem cells raises ethical concerns

Due to moral debates, regulation, and public protests, the contentious subject of (human) embryonic stem cells (HESCs) can no longer be ignored. Here, we'll discuss the bioethical debates surrounding HESCs, explain why they have the potential to be more widely accepted and demonstrate the various ways in which HESCs can be exploited for therapeutic ends. Notwithstanding some arguments over the ethical challenge of terminating fetal life, there has been a recent uptick in interest in using HESCs in biological therapies (4). Several proponents of HESCs for medicinal research have pointed out that not all religions provide full ethical standing to the embryonic stage, but only to the stage following implantation of the fetus (20). The ethical dilemma of

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HESCs was the subject of an investigation (21) in 2006. They looked at the ethical debate surrounding the use of HESCs from two different perspectives: the potential medical and curative usefulness of HESCs research, which raises few moral objections, and the fact that the issue of human ESCs is less concerning than many other ethical problems, such as the marketing of human organs. (22) proposed reprogramming HESCs (reprogrammed ESCs have fewer debates than stem cells harvested from the umbilical cord after birth) as a means of resolving the ethical dilemma surrounding HESCs and increasing the potential for using these cells (induced pluripotent stem cells) in therapeutic research. Notwithstanding certain constraints brought about by ethical disputes and the religious implications of utilizing hESCs from unborn infants (23) underlines that respect for fetal life does not conflict with the use of HESCs for therapeutic research. Researchers conducted many studies on the ethical implications of HESCs (24). They said that many religious groups have varied views on whether or not the soul is sacramental at various points in a person's life and that these views are reflected in ethical science. Some studies (17), for example, argue that one of the fundamental underpinnings of human rights is a reverence for human embryonic life at all stages of development.

The question of whether or not human embryonic life should be protected from 1-8 day unimplanted fetuses or implanted fetuses is at the heart of the controversy surrounding HESC research. Hence, the practice of

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destroying fetuses for the sake of harvesting has evolved; this argument refers directly to human dignity, which is criticized by any practical research that may impact human respect (25, 26). Human embryonic life would be valued even if HESCs were taken from unborn children if we consider human dignity and human rights. The killing of human embryos and the harvesting of a future human life, which might be seen as a desecration of the pledges of human rights for alleviating or rejecting any harmful human being, is at the heart of the ethical controversies surrounding most HESC investigations (22). It's possible, then, that the public may view research involving HESCs as inappropriate. The harvesting of HESCs has been the subject of much controversy, however, (27) argues that, due to issues of human dignity and religion, it is difficult to have the full rights of a non-implanted fetus. They claim that alleviating human suffering due to disorders such as congenital malformations is an ethical need of HESC research. The extraction of embryonic stem cells for use in curative applications in patients with chronic illnesses was also discovered, which is a crucial finding. Comparing the donation of embryos for therapeutic reasons to the donation of organs from a dying person to save the life of another, (28) shows that the use of embryonic stem cells is possible in certain situations.

The ethical implications of HESCs have received less attention than their medicinal and/or scientific potential (29, 30, 31). Hence, the bioethics of HESCs should be included in therapeutic investigations, as stated (11) in their investigation of the moral issue around HESCs. As a result, they

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may provide a future chance to develop and accomplish biological remedies. This debate over the morality of HESCs suggests that the ethical implications of this type of therapy should be taken into account in future biological research (21). To identify new therapies for chronic illnesses like cancer and diabetes, researchers need to take an impartial look at the potential efficacy of hESCs. Further debate and research into ethics, in comparison to the advantages of HESC usage, is required if more ethical consideration is required. This includes a review of the legislation that currently restricts the collection and usage of HESCs.

It's potential for use in medicinal treatment

The medical side of the embryonic stem cell issue is also important. Here, in this paragraph, the topic of safety might be approached from a variety of angles, including, but not limited to, the development of malignancies, the difficulty of immunological reflection, and the appearance of unforeseen negative consequences following treatment with HESCs. Opponents of HESCs treatment worry that the procedure might compromise patients' health in some way. Concerns that the application of such technology would lead to post-treatment pathological problems, such as mutational carcinogenesis (18, 32), have been voiced for the better part of two decades. Some who advocate for the use of HESCs in therapy, however, think that recent advances in biotechnology related to HESCs show great potential for treating a wide range

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of illnesses and mending damaged tissues. This discusses the arguments on both sides, shows how promising it may be for human care, and illustrates the most contentious areas of medical practice (29). As HESCs have therapeutic promise for human hereditary diseases, thorough research of their genetic traits is a crucial goal, as noted by (33)

Future applications research (34) concludes that HESCs are unique and immortal resources for cryotherapy of several incurable illnesses, including heart repair (29). These illnesses have impacted people everywhere, requiring extensive treatment and sometimes leading to an untimely demise. The field of nanomedicine has been recognized with a Nobel Prize (35). As a result of this innovation, the gap in understanding has narrowed, and researchers may now investigate the potential of this biotechnology in biomedical therapy. It may also be of value to investigate the monitoring of these cells in human and veterinary medicine. Human embryonic stem cells (HESCs) may generate and differentiate into any type of human adult cell, according to studies by (15) and (36). The unique properties of HESCs have been used to treat a wide range of conditions, including spinal cord injury (37), eye muscle atrophy, heart muscle illness, and diabetes (29). The discussions over scientific evidence for HESCs treatment and patient safety have been persistent for more than 10 years. (17) claimed that there may be a discrepancy between the scholars who agree to accept the integrity of HESCs in therapy and other scientists who considered there was inadequate scientific knowledge to be filled with safety studies in their

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examination of the safety of HESCs. After much deliberation, he believes that this treatment may impact patient safety in some way (38). This might take place because of insufficient ESC processing or the need for further empirical research on this technological approach (39) to establish an intriguing refinement in ESCs therapy, as evaluated by the potential to repair and regenerate the tissue damage for critical human organs like the heart and brain tissue and to cure immune system deficiencies. Because to the tremendous advancements in biomedical therapy, ESCs now hold the promise of being a miraculous treatment for people who have needed such care for a very long time. It provides more encouragement by showing how, despite their use in curing patients with challenging conditions, ESCs might be utilized as a particular tool to test the efficacy of medical diseases (40). Perhaps, this test might be used to determine whether or not a medicine is safe to use. In other words, this ESC-based test will help reduce the risks to human health associated with medication toxicity, ultimately saving lives. Much ESC-related research, without a doubt, hinge on this technology's capacity to eventually be used in therapeutic settings (14). There are a lot of theoretical novels that show a lot of potential for future empirical examination (41). This discussion and response suggest that, even though some people exposed to biotechnology may get cancer, it is possible to do thorough studies and validations of ESCs before putting them into clinical implementations.

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In conclusion

This technique has the potential to be a game-changer in the fight against incurable diseases including cardiac muscle dysfunction, Alzheimer's disease, diabetes, and others. Thus, a promising new development in biotechnology is anticipated to emerge shortly to meet the need for medical therapy among scientists. Hence, there are still concerns about the safety and therapeutic efficacy of HESCs, according to the scientific replies of the present emerging biotechnology.

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