Connection Between Abortions And Stem Cell Research

1. Introduction

In the last few years to reduce abortions serious efforts are being made by preparing new legislation by the government and which made abortion to be extended or included in “Personhood” legislation, which means Human life starts with fertilization of embryo. On a national level, there are different proposals advanced in different states, which states that “Human life shall be deemed to begin with fertilization” but, the proposal of ‘personhood” legislation was protested by many advocates and infertility practitioners around the country as it may be a serious criminal offense when an embryo is disposed of during the process of in-vitro fertilization (IVF). Abortion is a critical example of moral politics, which helps in shaping different attributes such as values, beliefs, and identity. Embryonic stem cell research (ESC), which works on the basis of conducting research of embryos is also categorized into the same category because the same attributes come with stem cell research (Embryonic Politics: Attitudes about Abortions, stem cell, n.d.).

When a debate about stem cell research or an abortion happens, they are different but, abortion and stem cell research are combined in the discussion because they share similar kinds of attributes and resemble each other. In different societies, people always take a chance in creating disputes regarding the scope of personhood as these debates occur more often on abortion and stem cell research (Janet L. Doglin, 2003). For creating a new perspective on the clinical application of embryonic stem cell research, this paper will consider the history of stem cell research, the current status of embryonic stem cell research, ethical concerns and future perspective on stem cell research (Ishii, T., & Eto, K., 2014).

2. Consent for use of aborted fetus

Aborted fetuses are widely used in medical research, both in established fields such as developmental biology and virology and more recently in research of stem cell science. Aborted fetuses fall under the provisions of the Human Tissue Act 2004. The separate provisions of the Human Fertilisation and Embryology Act 1990 afford the embryo created in vitro a high level of protection, and the Human Fertilisation and Embryology Authority regulates the creation and use of embryos in treatment and research, including stem cell research. The distinctive status of the aborted fetus is recognized in the Polkinghorne Guidelines, which currently govern fetal research. The committee took the view that only tissue from the dead fetus ex utero is ethically available for use; the 'supply' of fetal tissue must be separated from the practice of research and therapy - in other words, the investigator must not be involved in the procedure; the method of terminating the pregnancy must not be influenced by research requirements; and consent for research should be general, not specific. In the years since the Polkinghorne Guidelines were drawn up, specific and not general consent to the use of human tissue in research has become the norm, yet - controversially - because of the way consent guidelines have been framed with regard to women undergoing termination of pregnancy, they have been treated differently (Pfeffer, N., & Kent, J., 2006).

The working party convened in 2000 by the Medical Research Council to produce guidelines on

the collection of human tissue and biological samples for use in research insisted that specific consent is sought for the use of all human biological material in research, but made an exception of aborted fetuses, where general consent must apply. Three years later, responses to Human Bodies, Human Choices, the consultation document which informed the Human Tissue Act, revealed some agreement on a move towards specific consent in relation to the collection of aborted fetuses but also some resistance to providing women with a great deal of information about any future research. Research Ethics Committee approval is always required for the use of fetal tissue and products of conception in research. We found wide variability in the kinds of information being given to women being asked to agree to the use of aborted fetuses in stem cell research. Some projects are funded by the MRC, whose model consent form for research involving new samples of human biological material allows people to agree to or refuse the use of their tissue in possible future research projects, genetic tests of known clinical and/or predictive value, and other genetic research. In the year following publication of its Guidelines, the Human Fertilisation and Embryology Act created the HFEA, which is charged with oversight and inspection of how embryos created in vitro are sought and used in research (Pfeffer, N., & Kent, J., 2006).

The Human Fertilization and Embryology Regulations 2001 extended the list of purposes for which human embryo research could be licensed by the HFEA to include research aimed at understanding the development of embryos, or understanding or treating serious disease; that is, it effectively provides a regulated space in which human embryos might legitimately be used in stem cell research. The HFEA boasts of its capacity to maintain public confidence in a controversial field and takes the lead in encouraging awareness and debate about research and treatment involving human embryos. There is currently no publicly available information about the projects using fetal tissue in research, whereas the HFEA, in its annual report, lists all the research projects which it has approved. If the UK environment is to continue to be seen as facilitating stem cell research because of its strong approach to regulation, the current contradictions between the guidance set out in the Polkinghorne Guidelines and the law needs clarification (Pfeffer, N., & Kent, J., 2006).

3. Previous fetal tissue transplantation

3.1 Early attempts

A bibliographic survey revealed the use of fetal pancreatic transplantation to treat insulin-dependent diabetes mellitus, as well as an attempt to treat human cancer in Italy as early as 1928. The first fetal pancreatic transplantation in the United States was carried out in 1939. Subsequently, in 1959, two United States physicians reported the transplantation of fetal tissue derived from six stillborn fetuses into their diabetic mothers. These experiences in marrow transplantation simultaneously facilitated the development of fetal tissue transplantation, which ultimately became a frequently used therapeutic option in cases where no histocompatible donor was available for marrow transplantation (Ishii, T., & Eto, K., 2014).

3.2 Early 1960’s to ’80s

In 1961, a United Kingdom group reported the results of transplantation of fresh or stored fetal liver cells via intravenous injection to treat apoplastic anemia, stating that remission was achieved in two of 14 patients. In 1975, a United States group reported successful fetal liver

transplantation in a male infant with adenosine-deaminase deficiency, which causes severe combined immunodeficiency. Fetal liver transplantation has also been attempted to treat leukemia. In 1982, an Italian group reported the use of fetal liver transplantation in two patients with acute leukemia following the administration of a conditioning regimen consisting of cyclophosphamide and total body irradiation. In 1986, a Chinese group reported the results of fetal liver transplantation in 10 patients with malignant tumors (Ishii, T., & Eto, K., 2014). The authors prepared fetal liver cells using 3.5-6-mo-old fetuses and observed fetal liver cells in a fetus over five mo of age, in which most of the cells were CFU-Cs. These findings suggest that fetal liver transplantation improves the peripheral blood profile and stimulates the production of bone marrow. In February 1986, a symposium on fetal liver transplantation was held in New Delhi, India. In a review article published in 1987, a United States researcher, Gale, examined the results of fetal liver transplantation in patients with hematological disorders. Regarding thymus transplantation, two cases were reported in 1968, in which fetal thymus tissue was transplanted into neonates suffering from DiGeorge syndrome, which is characterized by the absence or incomplete development of the thymus with varying degrees of T-cell immunodeficiency. Another article reported that the combined transplantation of the fetal thymus and liver resulted in effective immunological reconstitution in a presumed case of DiGeorge syndrome. Cellular characteristics of fresh or preserved fetal tissue were insufficient in most cases, with total cell count usually being the only parameter reported, while the cell functions were not thoroughly assessed. Fetal tissue donors were not carefully screened, and testing of fetal tissue prior to transplantation was largely insufficient. Despite clinical success in some cases, the use of fetal liver and/or thymus transplantation should have been based on sufficient data from preclinical research using disease model animals, as is common in current stem cell research (Ishii, T., & Eto, K., 2014).

3.3 Mid 1980's to early 2000s

Around the mid-1980s, the application of fetal neural transplantation to treat neurological diseases began to receive significant attention. The transplantation of fetal neural tissue, including dopaminergic neurons, is thought to be an alternative treatment for PD. In addition to preclinical research using animal disease models, fetal neural tissue transplantation was performed based on preclinical data, including the impact of cryopreservation, and screening for infection and cytogenetic abnormalities. Regarding the in vivo survival of fetal tissues and cells, Freeman et al reported the implantation of human mesencephalic dopaminergic neurons in a rat model and suggested that the upper age limit should be postconception day 56 for suspension grafts and PC day 65 for solid implants. In September 1986, a Mexican group conducted a renowned clinical trial in which the fetal mesencephalic substantia nigra procured from a 13-wk-old fetus of spontaneous abortion, was transplanted in the caudate nucleus in two PD patients. In the preceding year, 1987 a Chinese team had already reported the transplantation of similar fetal tissue in a PD patient in August 1985, the first clinical trial in which brain tissue was transplanted from one human being to another. The case involved a 54-year-old male patient whose HLA status was determined prior to transplantation, although the fetal HLA status was not tested (Ishii, T., & Eto, K., 2014).

A United Kingdom group published a case report of fetal tissue transplantation for PD in 1988. Subsequently, a Swedish group demonstrated that deep brain transplantation of fetal brain tissue could be used to restore local dopamine production and relieve symptoms. Fetal tissue transplantation for PD has also been conducted using fetal adrenal medullary tissue other than

the substantia nigra, and several clinical trials have assessed the efficacy of fetal neural transplantation for neurological conditions other than PD. For instance, patients suffering from Huntington's disease have been evaluated in the United Kingdom. In the report, cell suspensions of fetal ganglionic eminence were transplanted unilaterally into the striatum in four patients with early to moderate HD, all of whom received immunotherapy with cyclosporin A, azathioprine, and prednisolone for at least six months postoperatively (Ishii, T., & Eto, K., 2014). The United Kingdom team concluded that the unilateral transplantation of fetal striatal tissue in patients with HD is safe and feasible. An Indian group issued a report in which human fetal neuroretinal cells were transplanted in patients with advanced retinitis pigmentosa. Notably, in 2001, a United States group reported the results of a double-blind, sham surgery controlled study of transplantation of fetal dopamine neurons in PD patients (Ishii, T., & Eto, K., 2014).

4. Ethical issues and political responses

The ethical debate in the United States, which involves the anti-abortion movement, led to a moratorium on federal funding of fetal tissue transplantation research. There are five issues related to fetal tissue transplantation. Second, the widespread use of fetal tissue transplantations may result in an increase in the number of abortions. Most notably, the question as to whether rightful informed consent for the use of fetal tissue can be obtained in cases of induced abortion is the most controversial issue. Ideally, the decision to undergo induced abortion should be completely separate from the consent to fetal tissue donation. In contrast, Medical Association dissented from the Polkinghorne report in their guidelines on the use of fetal tissue, and United Kingdom sociologists expressed concerns about the fetal tissue economy from the abortion clinic to the stem cell laboratory[107,108]. The 'Principle of separation' suggests fetal tissue can be procured if informed consent is separately obtained from females who underwent spontaneous abortion and stillbirth in Europe and the United States. The difficulty in the `principle of separation' in some cases is likely to lead to the exclusion of fetal cells in stem cell transplantation, as in Japan if future results of fetal tissue transplantation are overhyped (Ishii, T., & Eto, K., 2014).

Research using tissue derived from aborted fetuses is permitted in Britain, while deliberate abortion to provide fetal tissue for research is illegal. Investigators are advised to seek women's agreement to donate the fetus after they have signed the consent form for the abortion, and stem cell researchers seek fetuses aborted under the 'social' grounds of the Abortion Act 1967. The duty of care might apply to other research using aborted fetuses. What makes stem cell research more troubling is its association with renewal, regeneration, and immortality which people understood as somehow reinstating and even developing the fetus' physical existence and social biography, the very thing abortion is meant to eliminate (What women say matters to them about donating an aborted fetus to stem cell research: A focus group study, 2008).

5. Future studies

After reflecting on the history of fetal tissue cell transplantation, this report will now consider the future direction of stem cell transplantation based on issues related to donor cells, cell processing, and therapeutic cell niche. In contrast, adult tissue stem or progenitor cells, or terminally differentiated cells derived from non-fetal, adult tissues are more likely to be candidates for transplantation. Compared with adult tissue stem cells, ES cells proliferate more readily in vitro, and the directed differentiation of human ES cells can be used to produce the

desired lineage, with some types of differentiated cells currently being applied as grafts in clinical trials. Cell processing A few weeks of culture has frequently been applied to expand fetal cells prior to transplantation. If a change in the cell population is detected, the population intended for use in transplantation must be isolated via methods such as cell sorting, as the presence of a remaining unintentional cell population in the culture may cause side effects. Therapeutic cell niche The selection of appropriate diseases and symptoms largely constitutes successful transplantation therapy, subsequently requiring the systematic consideration of autonomous or non-autonomous cell pathology, the localization of the affected tissue, and the assessment of progressive vs chronic disease. Although only cell transplantation is considered to be efficacious in the setting of autonomous pathology, non-autonomous conditions are more likely to require extrinsic cues for proper use in stem cell transplantation (Ishii, T., & Eto, K., 2014).