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Human Fetal Tissue: Scientific Uses and Ethical Concerns

CAROL A. TAUER, PH.D.

ABSTRACT — Human fetal tissue has been used in research for decades, but recent attempts to implant fetal neural tissue as therapy for Parkinson's disease have stimulated discussion of ethical and policy issues. In late 1989 a moratorium on federal support of fetal tissue transplantation research was indefinitely extended, based on the connection between this research and elective abortion. Four abortion-related objections to the use of fetal tissue can be identified: 1. The procedures of abortion and tissue procurement are linked in practice; 2. One who uses fetal tissue is complicit with the abortions which provided the tissue; 3. The prospect of therapeutic use of tissue could influence some women to choose abortion; 4. The therapeutic success of fetal tissue transplants could lead to greater public acceptance of elective abortion. The moral significance of these objections is currently being debated.

Introduction

During the past few years, both the public media and scientific journals have reported a flurry of activity in the area of fetal tissue research. When this research involves the use of human fetal tissue, the issues are ethical and political as well as scientific and medical. Most appropriately, the recent interest in research involving human fetal tissue has been accompanied by vigorous discussion of related ethical and public policy questions.

The current high level of interest in the use of fetal tissue could lead one to believe that this area of research is a fairly new one. In particular, where human fetal tissue is involved, one might think that *Roe v. Wade*, which legalized abortion nationally in 1973, made this research possible. On the contrary, human fetal tissue has been used for research purposes for decades, and fetal tissue transplants for therapeutic purposes were attempted as early as 1928 (in Italy), and since the 1930s in the United States (1,2).

When elective abortion was illegal, researchers made use of whatever tissue was available, whether from spontaneous abortions or from abortions performed out of medical necessity. The pregnant women whose fetuses provided this tissue were probably unaware of the ways in which the tissue was used. Most likely, the consent form for surgical abortion simply included a sentence indicating that "tissue removed may be examined and retained for medical or educational purposes," as in other surgical consent forms. In case of spontaneous abortion in a hospital, consent was probably

assumed unless a woman specifically asked for information on the disposition of fetal material. After the legalization of abortion in the United States, consent forms customarily continued to include a simple sentence noting that tissue might be retained, examined, and utilized. Since this language is so widely used in relation to surgical practices, a woman could easily overlook it or perceive it as a formality. Thus, one of the consequences of recent intensified interest in fetal tissue research is an increased awareness of practices which have existed for decades. The existence of this research, the sources which researchers have used for procuring fetal tissue, and the level of consent to the research use of fetal tissue: all of these topics have now been brought into open discussion, with the aim of clarifying ethical standards and public policy objectives.

Fetal Tissue Transplants

While human fetal tissue has been used in research for years, apparently without raising much concern, recent attempts to use fetal tissue for transplants, particularly for victims of Parkinson's disease, have been highly controversial. The actual transplant of human fetal tissue into a diseased or disabled human being seems to arouse public interest in a way that laboratory study does not. The prospect of a cure for a serious disease is exciting; on the other hand, the fact that aborted fetuses provide the curative material may be objectionable or even abhorrent. In addition, if these transplant therapies become highly successful, one could anticipate the need for large quantities of fetal tissue in the future, far beyond what is currently used for a small number of research projects.

Fetal tissue transplants for persons with Parkinson's disease began only in the 1980s, but other types of tissue transplants have a much longer history. Even before the discovery of insulin, the possibility of using fetal pancreatic tissue to treat diabetes was suggested. The first actual attempt at such a transplantation was made in 1928, shortly after the discovery of insulin in 1921 (1). Between 1966 and 1988, there were at least 130 publications on human fetal

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pancreas and human fetal islet research. It is reported that approximately 600 insulin-dependent diabetic patients have received fetal pancreatic tissue transplants worldwide. The literature, however, documents only 38 such transplants were performed in U.S. institutions (3). Reports of transplants made to an international registry are disappointing, as they indicate that there have been no long-term successful human fetal pancreatic grafts (4).

Transplantation of fetal liver or thymus tissue also has a fairly long history (5). In 1959, a fetal liver transplant was performed on a leukemic patient, with no benefit recorded. In 1968, fetal thymus was used successfully to treat DiGeorge's syndrome, and in 1973, fetal liver achieved the reconstitution of the immune system of a patient with severe combined immunodeficiency (SCID). Transplantations of between 200 and 300 patients with fetal liver were reported before 1987, largely as an alternative to bone marrow transplants. Most clinical trials of fetal liver transplants have been conducted outside the United States, and results are difficult to interpret because of inadequacies in the reports or protocols. At present, fetal thymus is the accepted treatment for DiGeorge's syndrome, and fetal liver appears effective in treating SCID; both of these conditions are rare. Other uses of fetal liver or thymus tissue remain experimental at best (5).

The most dramatic use of fetal tissue has been the transplantation of fetal neural tissue into persons with Parkinson's disease. Before fetal tissue was tried, a number of neural transplants had been done using the patient's own adrenal tissue. Swedish researchers were the first to report their results, in 1985 and 1987. However, they judged that their four patients had received no significant clinical benefits (6,7). In contrast, Madrazo and his team in Mexico City reported striking successes in two reports published in 1987 (8,9). Videotapes of patients, before and after treatment, were made available and even shown in the mass media.

Encouraged by these successes, American researchers treated series of patients at 15 centers, reporting more than 100 adrenal transplants by July 1988. After following these patients for up to a year, researchers reported their overall results to be disappointing. No trial reproduced the results of the Mexican report (10). One commentator noted: "Irresistible forces have led to the application of an experimental technique to humans with disease in advance of a firm basis in neuroscience. This, of course, has happened before, but rarely is it a sequence to be recommended (11)."

Even as its results from adrenal transplants were under challenge, the team in Mexico proceeded to fetal neural transplants, also in Parkinson's patients. In January 1988, two patients received tissue from a single spontaneously aborted fetus, and substantial improvement in their symptoms was reported (12). This report was also challenged, largely because of the stated gestational age of the fetus, 13 weeks, which is too late for use of tissue of the substantia nigra, and too early for identification of adrenal tissue (10). Fetal neural transplants have also been reported from Sweden, where initial attempts achieved a minimal improvement in symptoms, and in November 1988 at the University of Colorado, where press accounts described improvement (10,13,14). The first well-documented success was announced by Swedish researchers in early February 1990; it involved the alleviation of symptoms of Parkinson's disease in one patient (15).

Currently Yale University is conducting a study involving 20 Parkinson's patients, which is believed to be the first controlled trial of fetal neural tissue transplants (10). Given

the largely inconclusive evidence from previous attempts, the careful trial planned at Yale is welcome. Subjective assessments of improvements in persons with Parkinson's disease can arise from wishful thinking, if protocols are not carefully planned and monitored. Many suffering persons and their families may have had their hopes raised without adequate scientific basis. In late 1988, the American Academy of Neurology warned that initial results called for caution, and proposed that further research be conducted only in highly specialized centers (14). Studies like the one at Yale may yield more reliable results and definitive answers.

Current Law and Regulation

On the sensitive topic of fetal tissue research, the concerns of ethics and the law intersect at many points. Legislative and regulatory bodies have looked to ethical expertise for guidance, and their declarations in turn have stimulated ethical reflection and discussion.

In order to avoid confusion, both in applying the law and in making ethical arguments, it is essential to distinguish dead from living fetuses. Discussions in the press and the media often suggest that fetal tissue used in research and transplantation is taken from living fetuses. While it is conceivable that that could be done, it is highly unlikely at the present time. Most abortions in the United States are performed by either vacuum aspiration during the first trimester, or by dilation and evacuation (D & E) in the second trimester. Between 90 and 93 percent of all abortions performed in the U.S. are done by vacuum aspiration, and about 6 percent by D & E (16,17). Thus, almost all available fetal tissue in the U.S. results from one of these two procedures, and in neither case could a living fetus possibly be presented. The two abortion procedures which might produce a living fetus are prostaglandin instillation and hysterotomy; together these methods account for less than one percent of all abortions in the United States.

Though researchers may require viable fetal tissue, or tissue which is alive, the tissue is removed from a fetus which is dead. Cells and tissue may continue to live up to several hours after fetal death. If cells or tissue are procured shortly after the death of the fetus, they may often be preserved for a much longer time under appropriate laboratory conditions, for example, cell culture or freezing.

Federal regulations enacted in 1975 severely limit research involving human fetuses; however, the restrictions apply to living fetuses. The only statement made regarding the remains of dead fetuses is the following:

Activities involving the dead fetus, macerated fetal material, or cells, tissue, or organs excised from a dead fetus shall be conducted only in accordance with any applicable State or local laws regarding such activities (18).

This statement is consistent with customary practices for the disposition of fetal remains. Several states (Arizona, Illinois, Indiana, North Dakota, Ohio, Oklahoma) specifically prohibit research involving fetuses whose death was caused by induced abortion. A similar Louisiana statute has been held unconstitutional, however, with the court reasoning that the state's interest in protecting fetal life "does not continue past the death of the fetus (19)."

If fetal tissue is to be used for transplantation, then state laws on the donation of tissue and organs for transplant purposes would also apply to fetal tissue. The Uniform Anatomical Gift Act (UAGA) was adopted by all states and

the District of Columbia by 1972. Its provisions specifically allow donation of the remains of stillborn infants and dead fetuses, if either parent consents and the other does not object. The UAGA does allow the donor to designate a recipient; this provision could be problematical with regard to fetal tissue since it might act as an incentive for choosing abortion (20).

The National Organ Transplant Act, passed in 1984 and amended in 1988, established a national voluntary Organ Procurement and Transplantation Network. In relation to fetal tissue, its prohibition of the sale of body parts is most significant. By specifically including fetal organs and tissue among these body parts, it set up a national legal barrier against their commercialization (20).

Federal Support of Fetal Tissue Transplant Research

Since federal regulations on fetal research do not prohibit the use of fetal tissue, there has been no legal obstacle to federal funding of fetal tissue research. Over the years, the National Institutes of Health (NIH) have conducted and funded research involving fetal tissue. In early 1988, however, a group of NIH scientists proposed their first attempts at implanting fetal neural tissue into patients with Parkinson's disease. The director of NIH became concerned about the implications of this research, and referred the matter to Robert Windom, Assistant Secretary of Health. Windom directed NIH to form a top-level panel of 21 members to consider and formulate responses to a series of questions he had prepared. These questions were mainly of an ethical nature, but also raised issues regarding the scientific merits and timeliness of such trials (21).

After three days of hearings and discussions, the NIH-appointed panel prepared and issued its responses. The issue it found most difficult to resolve was the relationship between fetal tissue transplantation and elective abortion. The ethical concerns arising from this relationship deeply divided the panel. In its final report, the panel concluded that safeguards could be established so that the two practices, elective abortion and fetal tissue transplantation, could be kept separate. Thus, it suggested that NIH could ethically support research on fetal tissue transplantation. Though the vote on crucial points was 18-3, the three dissenters provided persuasive and forceful arguments for their dissent. In addition, one person who voted with the majority dissented from personally approving federal funding (22).

The report of the panel was forwarded to Health and Human Services, where the new Assistant Secretary of Health, James O. Mason, was asked to make the decision. He was strongly influenced by the dissenting statements, particularly their concern over the decision-making process of a woman considering an abortion. He concluded that it was likely that the therapeutic use of fetal tissue would influence some undecided women to have abortions, and hence increase the incidence of abortion. Therefore, he continued a federal moratorium on support of fetal tissue transplantation research (23).

It is interesting to note that the moratorium on federal funding covers only transplantation research, and not other forms of research which utilize fetal tissue. Perhaps it is believed that only the immediate therapeutic use of tissue would induce women to have abortions. Or perhaps the distinction is a political one: since fetal tissue transplants have received much more publicity than other long-standing uses of this tissue, public sensitivities have been aroused and

expressed specifically in relation to transplant research.

Ethical Issues

Concurrent with the appointment of the NIH panel in spring 1988, the University of Minnesota Center for Biomedical Ethics undertook an extensive study of the ethics of fetal tissue research and transplantation. Experts in a variety of fields were asked to join its Research Group on the Use of Human Fetal Tissue, and in a series of meetings they shared information, listened to invited presentations, questioned, discussed, and debated. The results of their deliberations were announced in January 1990 in a report covering scientific, ethical, and policy aspects of the topic (24).

As a member of this group, I acknowledge my indebtedness to its members and consultants for much of the information in this review article. However, nothing in the review should be construed to represent the interpretations or opinions of the Research Group. The primary focus of its project and its report has been the identification and clarification of ethical and policy issues; that is also the purpose of this review article.

The ethical issues raised by fetal tissue research, specifically transplantation research, cover a broad range. Many of these issues are similar to questions raised in other contexts: Is this therapy still too unproven to test in humans? Are the patients on whom it is tested adequately informed as to risks and benefits? Is advantage taken of their desperate plight? If available grafts are limited, who decides which patients receive them? Who covers the costs? How are donated grafts to be obtained? Who can consent to donate organs, cells, or tissues, and how much information should potential donors be given? Who monitors the trials conducted in various centers so that reliable information is obtained? Behind these questions is the assumption that research is conducted ethically only when protocols safeguard personal autonomy, insure that harm and suffering are minimized, and achieve progress which is medically beneficial without treating persons or groups unjustly.

Certain issues, however, are unique to research and/or transplantation involving fetal tissue. These issues arise because the source of fetal tissue is aborted fetuses. In fact, most fetal tissue used for research or transplantation comes from elective abortions. The current number of induced abortions in the United States, about 1.6 million each year, assures a large quantity of fetal tissue, available at predictable times and generally of good quality. Neither spontaneous abortions, nor ectopic pregnancies, nor other medically problematic situations, could provide a significant quantity of tissue which is healthy, viable, and available at the time when it is needed (25).

The Use of Fetal Tissue and Abortion

Many people find the close connection between fetal tissue research and abortion immensely troubling. These people recognize that abortion is legal and widely practiced. However, they do not accept the morality of elective abortion, or at least of some elective abortions. They hesitate to condone any practices which might seem to encourage or cooperate with abortions that they view as immoral.* The use of fetal tissue for research or therapy appears to them to support immoral abortion.

As noted earlier, the three members who dissented from the main conclusions of the NIH panel took this position and strongly opposed any use of fetal tissue from elective

abortions (26,27), while a fourth dissenter opposed federal funding for fetal tissue research because of its connection with abortion (28).

The majority of the panel, however, held that even if elective abortion is immoral, one could morally use the resulting tissue. Given the tremendous benefits which might accrue from therapeutic use of fetal tissue, the panel approved its utilization, with safeguards to keep the abortion procedure separate from the process of procuring and using the fetal tissue (29).

In the following sections, objections to fetal tissue use based on its connection with abortion will be reviewed in detail. The major objections fall into four categories: 1. In practice, it is not possible to achieve the separation envisioned by the panel; 2. Whatever degree of separation is achieved, those who use fetal tissue are still involved in complicity with immoral abortions; 3. The prospect that fetal tissue could be used for a good purpose might lead some undecided pregnant women to choose abortion; 4. The widespread therapeutic use of fetal tissue might lead society to be more approving of elective abortion, hence making it politically more difficult to achieve restrictions on abortion in the future. Each of these points will be discussed separately.

The difficulty of separating fetal tissue research from abortion.

Various proposals have been made for separating the use of fetal tissue from the practice of abortion. These include:

- discussing the possibility of fetal tissue donation only after the consent to abortion has been signed;
- discussing fetal tissue donation only after the abortion has been completed;
- prohibiting payment or other compensation for fetal tissue, apart from the actual expenses of retrieval, preparation, and storage;
- prohibiting procurement agencies or researchers from working closely with those who perform abortions, for example, within abortion clinics.

Those who hold that, in practice, it is impossible to achieve a clear separation between tissue use and abortion, believe that implementation of the foregoing proposals cannot be assured. Abortion clinic personnel are charged with providing information and obtaining consent from the pregnant woman both for the abortion procedure and for tissue donation. This counseling is done privately, and no one could monitor at what time, or in what manner, fetal tissue donation was discussed. The most one could check would be the time at which a consent form was signed. Furthermore, as the public becomes knowledgeable about the potential uses of fetal tissue, most women will be acquainted with this possibility before coming to an abortion clinic.

Effective regulation of the procurement of tissue is still far in the future. Many researchers are reluctant to discuss their sources for fetal tissue. They may receive it from private

contacts, primarily obstetricians, and generally free of charge. Or they may order it from a laboratory or agency which acts as an intermediary in procuring tissue. Since 1961 the Central Laboratory for Human Embryology at the University of Washington has provided fetal tissue free of charge to researchers. In 1986 a non-profit agency was established mainly to procure human fetal tissue, under the name of the International Institute for the Advancement of Medicine. IIAM procures approximately 8,400 specimens per year for researchers. It has a price list for various types of specimens which it supplies, the fees intended to compensate the agency for procurement and processing expenses. This agency assigns its employees to work within abortion clinics in order to process the fetal tissue immediately after abortion. For this on-site access, IIAM pays a clinic up to \$1000 a month, and also encourages clinic doctors to use a modified abortion procedure which will increase the likelihood of viable tissue ensuing (30,31).

The procurement of tissue thus ranges from purely voluntary sharing by obstetricians to practices which appear quite business-like and deeply entangled with the institutionalized practice of abortion. There is no mechanism for regulation of tissue procurement at present, and thus, no mechanism for insuring that fetal tissue procurement and research are kept clearly separated from abortion. In fact, without significant NIH involvement in fetal tissue research, it is unlikely that regulation at the federal level will even be discussed.

Fetal tissue research as complicity with abortion.

Even if safeguards can be implemented to separate fetal tissue use from elective abortion, many people believe that one would still be complicit with abortion simply by using the resulting tissue. In this view, a user of tissue is supporting elective abortion, or cooperating with it, and hence must bear responsibility for immoral aspects of this practice.

The issue of complicity is probably the thorniest ethical dilemma related to fetal tissue research. On the one hand, given that the fetuses which provide the tissue are clearly dead, to use their remains appears consistent with ethically acceptable uses of the remains of dead children and adults. Even when a death is the result of murder or suicide, the donation and use of organs is considered legitimate.

In this vein, the Vatican *Instruction on Respect for Human Life* indicates that it is permissible to use tissue from fetuses that have been electively aborted, under certain conditions:

The corpses of human embryos and fetuses, whether they have been deliberately aborted or not, must be respected *just as the remains of other human beings*. In particular, they cannot be subjected to mutilation or to autopsies if their death has not yet been verified and without the consent of the parents or of the mother. Furthermore, the moral requirements must be safeguarded that there be no complicity in deliberate abortion and that the risk of scandal be avoided (32).

This statement seems clear and straightforward at first glance. However, it provides no interpretation or elucidation of the "complicity" and "scandal" which it says must be avoided.

This vagueness permits the Vatican statement to be used as support by persons who oppose fetal tissue use as well as by those who accept it. Opponents claim that the reality of abortion practice in the United States makes it impossible

* Throughout this article, the term "immoral abortions" is used without any presupposition as to which abortions might be included under that description. Surveys indicate that most people regard some abortions as immoral, while a substantial number consider most abortions immoral. Objections to the use of fetal tissue relate to whatever abortions an individual regards as immoral, either because of the reason for the abortion or because of the gestational age of the fetus.

to avoid complicity if one uses fetal tissue procured from elective abortions. While the representative of the National Conference of Catholic Bishops who testified to the NIH panel said that "in principle" it would not be wrong to use fetal remains, he clearly indicated that in practice, under currently existing conditions, it would be wrong (33).

Elective abortion is an institutionalized and legal practice in this country. Many persons make their living largely from their involvement with this practice. Thus, abortion is quite different from murder or suicide, isolated events which society goes to great lengths to prevent. No one interprets the use of a murder or suicide victim's organs as condoning or encouraging further murders or suicides.

The use of fetal tissue, the remains of a fetus aborted within a systematic practice, could have different implications. A person who procures or uses this tissue could easily be assumed to approve of the practice of abortion which regularly provides the fetal tissue. Does a fetal tissue researcher have any responsibility for clarifying his or her position on abortion? Is it necessary to make a clear statement of disapproval of whatever immoral abortions provided the tissue? Or is the researcher required to abstain entirely from using fetal tissue if that usage is apt to be misinterpreted as approving abortion?

Even if a researcher or transplant recipient publicly states his or her disapproval of the practice of abortion, these persons are clearly benefitting from the existence of the practice. Is it hypocritical to view a practice as immoral, and yet to welcome the benefits which are possible only because of this practice? In the case of an isolated event, say a death resulting from drunken driving or child abuse, one can surely benefit from donated organs while deploring the actions which made them available. But in case of a series of events which are part of an institutionalized practice, to condemn this practice while regularly benefitting from it may strike the observer as insincere, a type of "bad faith."

Some writers have drawn a distinction based on the relationship between the supply of fetal tissue and the demand for it (34,35). They believe that at the present time, since the amount of available fetal tissue far exceeds the research and transplantation demand for it, the user of fetal tissue need not be construed to have any responsibility for approving or encouraging abortion. These abortions would take place anyway, and the researcher or transplant recipient is merely taking advantage of a series of tragic events. However, if the need for fetal tissue were to outstrip the supply, so that research or transplantation depended on an expansion of the practice of abortion, then researchers and those involved in transplants could become partially responsible for extensions of the practice of elective abortion, according to these writers.

If advances were made in growing cell lines from fetal tissue, then a growing demand for fetal cells could be supplied through these cell lines. Only a small number of aborted fetuses would be needed to provide the initial fetal material, and propagation would take place in the laboratory. While the cell lines would retain some connection with the original abortions, the connection would be quite remote. Also, an increased need for tissue would not have the effect of stimulating the practice of abortion, since few abortions would be needed to provide the initial fetal material.

The issue of complicity demands the best thinking of all who are concerned with fetal tissue research: scientists, transplant surgeons, theologians, ethicists, legal scholars,

consultants on public policy. Whether one believes that most, or few, elective abortions are immoral, the existence of a practice which includes and accepts immoral abortions raises the complicity issue for essentially everyone. The moral significance of a direct connection between fetal tissue use and the practice of elective abortion is a concern which has yet to be adequately addressed.

Fetal tissue use as an incentive to abortion

A less abstract concern regarding the use of fetal tissue is whether the potential therapeutic benefit acts as an incentive to pregnant women to choose abortion. Many pregnant women go through a period of indecision when considering abortion. If they are aware that the fetal remains could be used for a good purpose, it is possible that this could "tip the scales" in terms of their decision to abort.

Dissenting members of the NIH panel found these considerations persuasive and emphasized them in their position papers (26,27). More importantly, despite all other arguments provided pro and con, James Mason of Health and Human Services based his final prohibition of NIH funding on this argument alone. He stated that "the additional rationalization of directly advancing the cause of human therapeutics cannot help but tilt some already vulnerable women toward a decision to have an abortion (28)."

The question of women's reasons for choosing abortion is an empirical issue, and as one would expect, has been studied and reported in the literature. Although many reasons have been identified, there is nothing which would lead one to conclude that the possibility of therapeutic use of fetal tissue would be significant in influencing women's abortion decisions. Up to this time, no studies have specifically asked about fetal tissue use as a possible reason for choosing abortion, so data are inconclusive either way.

However, one might attempt to extrapolate from available data. A recent survey of 1900 women who chose to terminate pregnancy reported an average of four reasons each for that choice. The most commonly cited reasons were: a baby would interfere with work, school, or other responsibilities (75%); cannot afford a child (66%); have no desire to be a single parent (50%)(36). Data over the years reinforce the perception that a woman's decision to have an abortion is almost entirely related to her own situation, the effect the pregnancy will have on her life, and whether she is able or willing to be a parent at the time (35,36,37). Among the 1900 women surveyed, more than one-fifth did indicate that their choice of abortion was partly due to the wishes of their husband, partner, or parents; but only one percent cited it as their most important reason (36).

These data suggest that the possibility of generalized altruism would not be a significant factor for a woman faced with an abortion decision. Pregnant women considering abortion appear to be almost totally absorbed in weighing the effect which motherhood would have on their lives. Their consideration of the wishes of others relates to specific identifiable persons who play a major role in their lives. Reasons aimed at a more general good for humankind, for example, "the world is overpopulated," are not cited as having a major influence in abortion decisions, and probably have no importance for those women who are undecided and struggling with the decision.

Extrapolation from available empirical information thus tends to support the conclusion that fetal tissue donation would not encourage individual women to have abortions.

To focus on this possibility is seen by many as demeaning to women, as it suggests that women are highly suggestible and easily influenced by appeals to their kindly and caring natures. Others take the concern more seriously and propose that safeguards be established to prevent even the possibility of such influence.

Safeguards mentioned earlier include separating consent to tissue donation from consent to abortion, or requesting consent after completion of abortion. There is almost universal agreement among ethicists that a woman should not be permitted to designate the recipient of fetal tissue (38,39). This provision would preclude a pregnant woman's interest in helping a specific individual with whom she has a relationship. Other proposals to minimize a woman's motivation to include tissue donation among her reasons for aborting have been made: for example, to use only 50 percent of all donated tissue and to inform women of that fact; or to list a large number of possible dispositions of fetal tissue and not provide assurance of any particular usage (other than prohibiting uses to which the woman objects).

The effect of fetal tissue use on public approval of abortion.

Since 1976, the number of abortions performed yearly has remained relatively stable, as have abortion rates (abortions per 100 live births)(40). Similarly, public opinion polls report that public acceptance of abortion has also remained steady since about 1973; approximately 50 percent of all Americans approve of the present legal status of abortion (41). A poll conducted nationwide by the New York Times and CBS News on January 12-15, 1989, asked: "Should abortion be legal as it is now, or legal only in such cases as rape, incest, or to save the life of the mother, or should it not be permitted at all?" While 46 percent of those polled said it should be completely legal, 41 percent said it should be legal only in situations like those enumerated, and 9 percent said it should not be permitted at all (42).

Given the margin of error in such polls, it appears that about half the population supports the present legal status of elective abortion, while about half disagrees with it. Because this division of opinion has remained consistent since the legalization of abortion, and because the abortion rate has stayed about the same for almost that long, the situation appears unusually stable. Events which have taken place over the years since 1973 do not seem to have affected either public opinion or the abortion rate. In certain specific areas, for example teen-age pregnancy, parental notification laws and other restrictions also appear to have had no effect either way on the overall rate of teen-age abortions. Minnesota is particularly cited as an example in this regard (43).

Given the stability of public opinion regarding abortion, what predictions can be made about the effect that fetal tissue transplantation would have on it? If these transplants proved to be therapeutically successful, it is possible that persons opposed to most abortions might look more favorably on them. However, predicting such changes in moral outlook is extremely difficult, if not impossible. Basing public policy decisions about fetal tissue use on their possible impact on public opinion regarding abortion would be making decisions on a purely hypothetical basis.

The Need for Regulation

This review has concentrated on ethical aspects of the use of fetal tissue which are specific to this topic, namely, issues related to the source of fetal tissue, elective abortion.

However, this focus does not diminish the seriousness of other ethical concerns. One of the most crucial concerns relates to the government's decision not to support fetal tissue transplantation research at the federal level.

An opponent of the use of fetal tissue for research or transplantation will surely oppose federal support for such projects. However, as noted earlier, NIH continues to fund fetal tissue research which does not involve transplantation. Moreover, attempts at fetal tissue transplantation will continue under other sponsorship, both worldwide and within the United States.

It is reasonable to ask whether it is better for the federal government to take a "hands off" approach to transplantation research as it has, or whether it ought to maintain an involvement that enables it to set standards and act in a regulatory capacity. In the U.S., the majority of research funding in the areas of medicine and health comes from the federal government. Standards and regulations imposed by federal funding agencies have an impact far beyond the funded projects which are strictly bound by them. Privately funded researchers, non-federal institutions, whether private or state, even scientific journals, tend to accept standards and regulations of federal agencies to guide their own practice. Thus, in withdrawing from the area of fetal tissue transplantation, the federal government has also abrogated its role as guide and regulator (31).

Commentators have noted that there are two aspects of fetal tissue transplantation research that show a particular need for some controls at this time. The first is the lack of established standards for scientific protocols and projects. As shown earlier in this review, the success of fetal tissue transplantation is questionable in many respects. Reported "cures" or "significant improvements" often have not been verified or replicated. Other series of trials have gone into the high hundreds (for example, with fetal pancreatic transplants), without any long-term successful outcomes. Established standards for research centers and projects would minimize the use of fetal tissue for attempts at transplantation which will not yield scientifically valid results, and would support the recommendations for careful screening of research centers that have been made by professional associations such as the American Academy of Neurology (14).

The second concern involves the procurement of fetal tissue. While solid organ procurement is carefully regulated in the U.S., tissue procurement is not, despite the fact that some fetal tissue research not involving transplantation continues to be federally funded. The varied sources from which researchers obtain fetal tissue, the vastly differing procedures and standards utilized by different procurement laboratories or agencies, plus the secrecy under which much of this activity is conducted; all contribute to a situation where ethical abuses cannot even be detected, much less corrected. Without federal involvement, effective regulation is not likely to occur in the area of fetal tissue procurement (30,31,44).

Thus, the cessation of NIH support of research in fetal tissue transplantation will have a mixed effect. In some ways, it may curtail this research and the related procurement of tissue. But for those researchers and medical practitioners who have other resources and avenues of access, the work will probably continue. If there are few agencies involved in procuring tissue for these research projects, those that continue to function will have even more freedom to set their own policies without checks or challenges. Widely varying scientific and ethical standards will continue to operate. If

withdrawal of federal funding means essentially the end of the public debate on policy, that could be cause for great concern.

Research Group Report

The full report of the Research Group on the Use of Human Fetal Tissue is available for \$18.00 per copy through the Center for Biomedical Ethics, UHMC Box 33, Harvard St. at East River Road, Minneapolis, MN 55455, Attn: Mara. Checks should be payable to the Biomedical Ethics Center Fund. *The Use of Human Fetal Tissue: Scientific, Ethical and Policy Concerns* discusses advantages and alternatives to fetal tissue transplants, reviews current policies governing fetal tissue use, presents possible ethical frameworks for evaluation of fetal tissue use, and reviews the ethical arguments regarding elective abortion and fetal tissue use.

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