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## **Fetal Tissue Research**

by

**Mary Carrington Coutts**

### **I. INTRODUCTION**

In recent years, the use of tissue from fetal remains for transplantation and biomedical research has surfaced as a controversy that involves scientists, doctors, patients and the federal government. Fetal tissue is potentially useful in a wide range of treatments for a number of serious diseases, some of them affecting millions of people. Despite the promise, transplantation research using fetal tissue from induced abortion slowed dramatically in the U.S. in 1988, when a moratorium was declared on federal funding for such research involving humans. That moratorium was lifted by President Clinton on January 21, 1993. Though the future of fetal tissue transplantation research is brighter, public debate on the issue is likely to continue, exacerbated by the “acrimonious abortion debate” (VI, Post 1991, p. 14).

Using fetal tissue in biomedical research and in transplantation is not a new practice. As early as 1928 unsuccessful attempts were made to transplant fetal pancreas cells into diabetics (VII, Fichera 1928). Fetal tissue was used effectively in biomedical research during the 1950s, and was instrumental in the culture of the polio virus, which led to the development of the polio vaccine. Fetal tissue cultures were also essential in the development of the rubella vaccine, and continue to be used in virology research. Transplantation of fetal thymus cells into patients with DiGeorge Syndrome has been recognized as effective therapy since the late 1960s.

Many of the therapeutic applications involving fetal tissue are still in the experimental stage, so it is difficult to pinpoint fetal tissue transplantation’s potential. One promising application is the transplantation of human fetal brain cells into the substantia nigra of patients with Parkinson’s disease to restore motor function. Fetal neural transplants have also shown promise for patients suffering from Alzheimer’s disease, spinal cord and other neural tissue injuries, and possibly some forms of cortical blindness. Fetal liver cells may be useful for treatment of some kinds of bone marrow disease seen in leukemia and aplastic anemia patients. Fetal tissue transplantation may also help those suffering from blood clotting disorders, such as sickle cell anemia, thalassemia, and hemophilia. Fetal pancreatic tissue has potential applications in the treatment of diabetes, especially juvenile onset diabetes. Human gene therapy may also employ embryonic and early fetal cells.

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The Center for Biomedical Ethics at the University of Minnesota reports that more than 1000 patients have received transplanted fetal tissue worldwide. Countries where fetal tissue transplantation has occurred include: Australia, Canada, China, the Commonwealth of Independent States (formerly the U.S.S.R.), Cuba, Czechoslovakia, Finland, France, Germany, Great Britain, Hungary, India, Italy, Mexico, Norway, Spain, Sweden, and Yugoslavia (IV, Vawter 1992, p.2; I, Spain 1988; VII, Reinikainen 1989).

Fetal tissue has unique characteristics that make it especially valuable in some treatments. Fetal cells develop much faster than do adult cells, hastening their therapeutic effect — a potentially significant benefit for gravely ill patients. They are also less likely to be rejected by transplant recipients because they are less antigenic than adult cells. This reduces the need for exact tissue matches that can be so difficult to obtain. Fetal tissue is also easier to culture and proliferates more readily than comparable adult tissue. Furthermore, fetal tissue is in greater supply, due to the number of elective abortions.

Questions about the use of fetuses and fetal tissue in biomedical research were raised in the United States in the early 1970s. Between 1969 and 1973, all 50 states enacted the Uniform Anatomical Gift Act, allowing for the donation of all or part of the body of a dead fetus for research or therapeutic research. Prospects for the use of fetal tissue increased after the Supreme Court decision in *Roe v. Wade* legalized abortion. As the availability of fetal tissue increased, so did the concern over the potential for controversial research on living,

soon-to-be-aborted fetuses and anxiety over maltreatment of dead abortuses. Vivid examples include Geoffrey Chamberlain's 1968 report of an experiment on a fetus of 26 weeks gestational age. Delivered by hysterotomy from a 14-year-old patient, the fetus was attached to an "artificial placenta" and kept alive for more than 5 hours before it expired (VII, Chamberlain 1968). Another researcher, Peter Adam, reported using an "isolated perfused human fetal brain" — the severed head of an aborted fetus — to study brain metabolism in early human development (VII, Adam 1975).

"There is no doubt that fetal tissue transplantation evokes ghoulish images of the procedure itself as an assault and a mutilation of immature human beings" (V, Mahowald 1987, p. 15). Some observers have compared fetal research to the specter of experiments by Nazi doctors on subjects doomed to die (IV, Bopp 1989, p. 72). In the early 1970s there were reports that the National Institutes of Health (NIH) was funding research on living fetuses (III, Vawter 1990, p. 11), and some researchers proposed experimenting on or harvesting tissue from fetuses that were to be, or recently had been aborted, but were not yet dead. For the most part, these extreme cases have been eliminated by federal regulations on human experimentation, but similar concerns persist today. In 1989, an article published by Swedish, British, and American authors described their method of retrieving fresh fetal brain tissue as suctioning brain tissue from the fetus while it was still alive *in utero* (VII, Lindvall 1989). While this is believed to be an isolated incident in another country, the article raised some of the old concerns about the use of fetal tissue.

### Regulation of Fetal Tissue Research

Various commissions have been established in the United States and abroad to study the question of using fetal tissue. Some early reports examined research on live fetuses and pregnant women, paying little attention to the transplantation of fetal tissue. Later reports have focused more on the use of tissue from dead fetuses. Most committees have made distinctions between different categories of fetuses, depending on age and weight of the fetus, viability (the likelihood of the fetus surviving

outside the uterus), whether the research was to take place *in utero* or *ex utero*, whether the research was to directly benefit that fetus, and, finally, whether or not the fetus was alive. All commissions have concluded that some types of research on living fetuses and the use of some fetal tissue is ethical, provided that certain safeguards are put in place. Different countries allow varying kinds of research, but none of the commissions have recommended that fetal tissue research not be allowed to continue. (See Section II of this Scope Note for a compilation of documents from U.S. and international commissions and organizations).

The first major policy statement was produced in 1972 by a British advisory group, commonly referred to as the Peel Commission. The committee report established guidelines for the use of human fetal tissue research in Great Britain. The Peel Commission's recommendations were updated in 1989 by the Polkinghorne Commission, which eliminated previous distinctions between viable and nonviable fetuses, and recommended that a government agency be established to act as an intermediary between the abortion clinic and the fetal tissue researcher. Current British guidelines for fetal tissue research stipulate that consent will be given in two separate stages: first for the abortion, then for tissue donation. No direct contact is allowed between the abortion clinics and the tissue researchers. To safeguard against the possibility of excessive transfer of brain tissue between a fetus and a recipient, only isolated neurons or fragments of tissue are allowed to be used.

In the U.S., the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research was established in 1974 within the Department of Health, Education and Welfare (HEW). The Commission's first task was to investigate research involving the fetus, and to recommend whether, and under what circumstances, such research could be conducted or funded by the federal government. Until the Commission had studied the topic and made its recommendations, most research on living human fetuses was banned in the United States. The Commission conducted public hearings, gathered statements by scientists, ethicists, philosophers and lawyers and studied the topic in depth.

The Commission concluded that living fetuses (*in utero* or *ex utero*) were not to be research subjects unless the research was intended to benefit that fetus or its mother and unless it posed no added risk to the fetus. The research was also not permitted to terminate the heartbeat or respiration of the living fetus *ex utero*. Strict guidelines were set under which research on living fetuses or their tissue would be allowed: an institutional review board must grant approval; those harvesting tissue could not have any part in the timing, method or procedures used to terminate a pregnancy; no changes in termination procedure could entail greater than minimal risk to the fetus or pregnant woman; no inducements could be offered to terminate a pregnancy; both parents must consent; and artificially maintaining the vital signs of living, nonviable fetuses was prohibited.

The guidelines for research on dead fetuses or fetal tissue were much less specific. There has been some debate over which, if any, of the federal regulations on living fetuses pertained to dead fetuses (II, U.S. National Institutes of Health, HFTTR Panel 1988, p. D21). This type of research could be conducted if done in accordance with commonly held convictions regarding respect for the dead, and in accordance with state and local laws (II, U.S. National Commission 1975, Report, p.75).

The recommendations of the Commission led to the lifting of HEW's funding ban in July 1975, and to the promulgation of regulations for fetal research (VII, U.S. Department 1975, 1978). In 1988 Congress amended the National Organ Transplant Act to include fetal organs and tissues in the list of body parts and tissues that may not be bought or sold (VII, U.S. Congress 1988).

### **The Moratorium in the U.S.**

Though there was not much federal funding for the use of fetal tissue in human transplantation, research progressed steadily for a decade under these guidelines. A new round of controversy was touched off in the spring of 1987 when Mexican researchers reported in the *New England Journal of Medicine* that they had transplanted fetal neural tissue into the brains of two young Parkinson's disease patients, and that the condition of both

patients improved substantially (VII, Madraza 1987). In the fall of 1987 the NIH Director (James Wyngaarden, M.D.) sought the advice of the Department of Health and Human Services (HHS) in considering the funding of an intramural research protocol to transplant fetal tissue into patients with Parkinson's disease. In March of 1988 the Assistant Secretary of Health (Robert Windom, M.D.) withheld approval of the protocol until an advisory committee could be established to evaluate the ethical, legal and social implications of fetal tissue transplantation. All federal funding of research involving the transplantation of tissue from induced abortions into humans was halted. While privately funded research was still allowed, and transplantation using spontaneously aborted fetal tissue was still permitted, this moratorium had a serious effect on transplantation research.

In September 1988 the NIH convened a panel of non-government experts — ethicists, lawyers, theologians, physicians and biomedical researchers — representing varied outlooks on the use of fetal tissue, and on abortion. The conclusion of a substantial majority of the panel members was that though “it is of moral relevance that human fetal tissue has been obtained from induced abortion,” fetal tissue transplantation research is “acceptable public policy”, provided that certain safeguards are in place. They recommended that there be anonymity between the donor and the recipient, and that special consent procedures be used to separate the decision to abort from the decision to donate tissue. These recommendations were in keeping with other guidelines established in other countries and “located squarely in the middle” of international consensus (II, U.S. National Institutes of Health, Advisory Committee 1988, p. C5).

The Advisory panel's report went to the NIH Director's standing advisory committee, which unanimously accepted the special panel's report without change. The NIH Director requested that the HHS lift the moratorium, but this was not done. In the next administration, under President Bush, the Secretary of HHS (Louis Sullivan, M.D.) and the Assistant Secretary for Health (James O. Mason, M.D.) were persuaded that permitting fetal tissue transplantation research would increase the incidence of abortion. They

argued 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” (IV, U.S. Congress, House 1991, p. 7). On November 2, 1989, Louis Sullivan approved an indefinite extension to the moratorium on federal funding for transplantation research involving fetal tissue from induced abortions.

Under the moratorium, fetal tissue research has continued slowly in the U.S. with private funding, and in other countries. Some bills to lift the ban have been introduced in the U.S. Congress, but they have either not been passed, or were vetoed by President Bush and Congress failed to override the presidential veto (IV, U.S. Congress 1992).

In May 1992, just prior to his veto of H.R. 2507, President Bush signed an executive order establishing a fetal tissue bank, which would collect and distribute tissue resulting from spontaneous abortions and ectopic pregnancies. Opinions vary on whether enough tissue could be collected from such abortions to satisfy the requirements of biomedical researchers, and whether the resulting tissue would be of high enough quality, and sufficiently free of genetic defects to prove useful (III, Vawter et al. 1990). Some commentators also believe that the costs of collecting enough tissue would be prohibitive (IV, Hilts 1992).

In June 1992, Senators Waxman and Kennedy introduced legislation that would give the new tissue bank one year to become established, after which point, a researcher would be allowed to use aborted fetal tissue if the bank could not provide suitable tissue within 14 days of the request. This legislation also failed.

Other tactics have been used by the research community in an effort to overturn the ban on aborted fetal tissue research. In late October 1992, five disease and research groups sued HHS, charging that the Department had violated the Administrative Procedures Act when it made permanent a temporary ban on the research without following the law on proper public notice. The political climate against fetal tissue research changed with the new administration, and with President Clinton's lifting of the moratorium on funding for

fetal tissue transplantation research shortly after he took office (VII, Toner, 1993).

### **Arguments in Favor of the Use of Fetal Tissue**

Proponents of the use of fetal tissue emphasize the long-awaited benefits for people suffering from devastating and often fatal diseases — people who may have no other hope, or for whom all other therapies have already been exhausted.

Those concerned with possible abuses of pregnant women or fetuses have pointed to a number of safeguards that can be put in place. The connection between abortion and tissue research should be isolated as much as possible. The opportunity to donate fetal tissue should be presented only after a woman has decided to proceed with an abortion. There should be no monetary reward for donating fetal tissue. Directed donation of fetal tissue should be banned to prevent women from conceiving fetuses with the intention of aborting the fetus and using the tissue for the benefit of a loved one.

Some authors believe that women's motives for having abortions have been trivialized, and that their decision making capacity has been challenged. They argue that women take abortion decisions seriously and that they are not easily influenced by societal pressures to help others. They do not agree that the prospect of assisting an anonymous patient by fetal tissue donation would encourage a woman to abort her fetus. There are so many other factors in the decision to abort that the prospect of donating tissue is not likely to "tip the scales", they contend (VII, Vawter and Gervais 1992).

Others point out that there is a double standard for laboratory research and clinical research. In the U.S., the moratorium extends to federal funding for transplantation research in human subjects using fetal tissue from induced abortions. However, the same aborted tissue may be used in the laboratory setting so long as it is not transplanted. The American Federation for Clinical Research has questioned the wisdom of such public policy.

In testimony at a Senate hearing, the organization charged that the ban on fetal tissue transplantation

"tells all biomedical scientists that in addition to beating four-to-one odds in obtaining an NIH grant, you must now pass a political litmus test before you can proceed with a scientific endeavor" (IV, U.S. Congress, Senate 1991, p. 77).

### **Arguments Against the Use of Fetal Tissue**

Many opponents of fetal tissue research believe that elective abortion is morally wrong, and that using fetal tissue from elective abortions is a way of legitimizing abortion. They contend that women who are undecided about whether to have an abortion will feel less guilty about one if they think they can help another person by donating the fetus to research. The development of successful fetal tissue transplantation therapies might result in an increase in the number of abortions. Others worry that successful use of fetal tissue could encourage the institution of abortion, and make it more socially acceptable. If the medical research establishment becomes dependent on elective aborted fetuses, an irreversible institutional and economic bond between abortion centers and biomedical science will be established. The use of fetal tissue from elective abortions might create political turmoil in a nation already deeply divided over the abortion issue (VI, Post 1991). Others speculate that the legalization of the use of fetal tissue would dilute support for challenging the current legal climate that allows elective abortion (IV, Robertson 1988).

Some commentators question whether rightful informed consent can be obtained for use of fetal tissue from induced abortions (VI, Barry and Kesler 1990). James Burtchaell and Paul Ramsey argue that "when a parent resolves to destroy her unborn, she abdicates her right to make decisions on the fetus' behalf" (VI, Burtchaell 1989, p. 156; III, Ramsey 1975, p. 93), thus rendering her ineligible to give informed consent to research on the fetus.

Other authors see the use of aborted fetal tissue as the first step down a slippery slope — at the bottom of which are the Nazi experimenters — researchers without scruples, without moral integrity and without concern for the dignity of the research subject, or the dead fetus (IV, Bopp and

Burtchaell 1989; VII, Cameron 1988).

Some observers focus on guilt by association, or complicity in abortion. The researcher would become a party, after the fact, to the destruction of the unborn (VI, Burtchaell 1989, p. 163). Thus, it follows that the mother, the researcher, and even the funding agency would be guilty of encouraging or performing an immoral act. It is not possible, according to these writers, to insulate the immorality of abortion from the use of the aborted fetal tissue.

In his letter to Congress, James Mason expressed concern that families desperate to help a loved one were being given false hopes and inflated expectations by those supporting the use of fetal tissue.

Still others argue that not all alternative treatments for these diseases have been exhausted. Cell lines may be cultured *in vitro*, reducing the need for fresh tissue (VI, Burtchaell 1989, p. 180). The fetal tissue bank, which collects only tissue from ectopic pregnancies and spontaneous abortions, may also reduce the dependence on fetal tissue from elective abortions.

Finally, some commentators argue that some tissue transplantation research is premature, and that not all animal studies have been pursued (III, Sladek and Shoulson 1988).

## **II. ORGANIZATIONAL & GOVERNMENTAL POLICIES & STATEMENTS**

In his presentation to the NIH Director's Advisory Committee, LeRoy Walters explained why studying similar policy statements from other organizations and countries are so important: "...There is, of course, no guarantee that the eight committees and the one parliamentary assembly have reached a conclusion that is ethically correct. However, we are less likely to make a serious moral mistake when numerous other groups of conscientious men and women from around the world have reached virtually identical conclusions about appropriate public policy" (II, U.S. National Institutes of Health, Advisory Committee 1988, p. C5).

Listed below are many government task forces and advisory committees that have studied the issue of using fetal tissue in human transplantation research. They have all reached the conclusion that if proper safeguards and regulations are observed, some uses of fetal tissue from induced abortions are acceptable. There are similarities and distinctions among the documents, but taken together, they provide a thorough overview of ethical and public policy concerns surrounding the use of fetal tissue.

Some of these advisory panels discussed the use of a variety of tissues, and some addressed not just tissue, but also experimentation on live fetuses. Some of the statements below are simple declarations that fetal tissue should be handled with commonly held respect for dead bodies; others are much more explicit.

Many groups have made distinctions between fetuses *in utero* or *ex utero*, between viable and non-viable fetuses, between live and dead fetuses, and between therapeutic and non-therapeutic research. Commonly, the committees expressed concern that animal studies precede human fetal studies, that the information sought be obtainable only by studying fetuses, and that risks and benefits to the fetus and mother be identified, minimized and fully explained to the mother. Some committees required the father's consent to donate tissue, while others accepted his non-objection.

Most committees expressed concern about the moral relevance of abortion to the use of aborted fetal tissue. In order to address problems of complicity with abortion, many advisory committees specified that, as much as possible, a woman's decision to abort should be separated from her decision to donate fetal tissue for transplantation. Most groups required anonymity between the donor and the recipient. Some committees were concerned that individuals involved in research have no say in the timing, method or procedures used to terminate pregnancy, some suggested an independent, non-profit agency to gather and distribute the tissue, so as to reduce problems with conflict of interest.

All committees specified that no one should benefit economically from donating or distributing

tissue, and most required some form of record keeping. Many advisory panels stated that fetal tissue research should be permitted if it is consistent with local laws and subject to approval of local institutional review boards.

American Academy of Pediatrics. Task Force on Pediatric Research, Informed Consent and Medical Ethics. **AAP Code of Ethics for the Use of Fetuses and Fetal Material for Research.** *Pediatrics* 56(2): 304-5, August 1975.

American Medical Association. Council on Scientific Affairs and Council on Ethical and Judicial Affairs. **Medical Applications of Fetal Tissue Transplantation.** *Journal of the American Medical Association* 263(4): 565-70, 26 January 1990.

Australia. National Health and Medical Research Council. Medical Research Ethics Committee. **NHMRC Report: Ethics in Medical Research Involving the Human Fetus and Human Fetal Tissue.** *Medical Journal of Australia* 140(10): 610-20, 12 May 1984.

British Medical Association. **Guidelines on the Use of Fetal Tissue.** *Lancet* I(8594): 1119, 14 May 1988.

Canada. Medical Research Council. **Research with Fetuses and Embryos.** In: **GUIDELINES ON RESEARCH INVOLVING HUMAN SUBJECTS.** Ottawa: The Council, 1987. 65 p.

Council of Europe. Parliamentary Assembly. **RECOMMENDATION 1100 (1989): ON THE USE OF HUMAN EMBRYOS AND FOETUSES IN SCIENTIFIC RESEARCH.** Strasbourg: The Council, 1989. 10 p.

Danish Council of Ethics. **PROTECTION OF HUMAN GAMETES, FERTILIZED OVA, EMBRYOS AND FETUSES: A REPORT [AND] SECOND ANNUAL REPORT, 1989.** Copenhagen: The Council, 1990. 147 p.

France. Comité Consultatif National d'Éthique pour les Sciences de la Vie et de la Santé. **AVIS SUR LES PRÉLÈVEMENTS DE TISSUS D'EMBRYONS OU DE FOETUS HUMAINS MORTS A DES FINS THERAPEUTIQUES,**

**DIAGNOSTIQUES ET SCIENTIFIQUES [REPORT ON THE USE OF TISSUES FROM EMBRYOS OR FROM DEAD HUMAN FETUSES FOR THERAPEUTIC, DIAGNOSTIC, AND SCIENTIFIC PURPOSES].** Paris: The Comité, 22 May 1984. 10 p.

Great Britain. Committee to Review the Guidance on the Research Use of Fetuses and Fetal Material. **REVIEW OF THE GUIDANCE ON THE RESEARCH USE OF FETUSES AND FETAL MATERIAL.** (Chairman: John Polkinghorne). London: Her Majesty's Stationery Office, July 1989. 30 p.

Great Britain. Department of Health and Social Security, Scottish Home and Health Department. **THE USE OF FETUSES AND FETAL MATERIAL FOR RESEARCH.** (Chairman: Sir John Peel). London: Her Majesty's Stationery Office, 1972. 15 p. (reprinted in U.S. National Commission... Research on the Fetus).

Greely, Henry T.; Hamm, Thomas; Johnson, Rodney; Price, Carole R.; Weingarten, Randy, Raffin, Thomas. Stanford University Medical Center. Committee on Ethics. **The Ethical Use of Human Fetal Tissue in Medicine.** *New England Journal of Medicine* 320(16): 1093-96, 20 April 1989.

Netherlands. Gezondheidsraad [Health Council of the Netherlands]. Committee. **[PROVISION AND USE OF FETUSES, FETAL TISSUE OR OTHER MORTAL REMAINS AFTER ABORTION, FOR SCIENTIFIC PURPOSES].** Hague: The Council, 1983.

Norway. National Committee for Medical Research Ethics. **RESEARCH ON FETUSES.** Oslo: The Committee, 1990. 29 p.

Spain. **ACT 42/1988 OF 28TH DECEMBER, ON THE DONATION AND UTILIZATION OF HUMAN FETUS AND EMBRYOS OR OF THEIR CELLS, TISSUES AND ORGANS** (BOE No. 314, of 31st December). Madrid, 1988. 7 p.

Swedish Society of Medicine. Delegation for Medical Ethics. **GUIDING PRINCIPLES FOR**

**THE USE OF FETAL TISSUE IN CLINICAL TRANSPLANTATION RESEARCH.** Stockholm, Sweden: Swedish Society of Medicine, 1990. 3 p.

U.S. National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. **RESEARCH ON THE FETUS: REPORT AND RECOMMENDATIONS.** Washington: Department of Health, Education, and Welfare, 1975. (2 vols.: Report and Appendix).

U.S. National Institutes of Health. Advisory Committee to the Director. **HUMAN FETAL TISSUE TRANSPLANTATION RESEARCH: REPORT.** Bethesda, MD: The Committee, 14 December 1988. 41 p.

U.S. National Institutes of Health. (HFTTR) Human Fetal Tissue Transplantation Research Panel. **REPORT OF THE HUMAN FETAL TISSUE TRANSPLANTATION RESEARCH PANEL.** (Chairman: Arlin M. Adams). Bethesda, MD: The Panel, 12 December 1988. (2 vols.: Report and Appendix).

World Medical Association. **World Medical Association Statement on Fetal Tissue Transplantation.** *Bulletin of Medical Ethics* 55: 8-9, January/February 1990.

### III. GENERAL

Burtchaell, James Tunstead; Freedman, Benjamin; and Robertson, John A. **Case Study: University Policy on Experimental Use of Aborted Fetal Tissue.** *IRB: A Review of Human Subjects Research* 10(4): 7-11, July/August 1988. (See: comments 10(6): 1-8, November/December 1988; rebuttal 11(2): 9-12, March/April 1989.)

University of Notre Dame theologian Burtchaell describes the decision at Notre Dame to ban the use of electively aborted fetal tissue in biomedical research. The original article and ensuing comments by Freedman and Robertson present a debate on the issues of complicity with abortion, and the rights of the woman to donate the tissue of her aborted fetus.

Cefalo, Robert C., and Engelhardt, H. Tristram.

**The Use of Fetal and Anencephalic Tissue for Transplantation.** *Journal of Medicine and Philosophy* 14(1): 25-43, February 1989.

Drs. Cefalo and Engelhardt question the extent to which those who disapprove of abortion may make use of tissues derived from abortion in order to treat serious diseases. They argue that, with proper safeguards, such tissue can be used without cooperating in abortion. That is, even those who oppose abortion can benefit from the use of tissue procured during abortion.

Fine, Alan. **The Ethics of Fetal Tissue Transplants.** *Hastings Center Report* 18(3): 5-8, June/July 1988.

Canadian physiologist Fine outlines the major objections and concerns surrounding the use of fetal tissue. He warns that the pace of scientific research must not preempt public debate and a verdict consistent with social values.

Hansen, John T., and Sladek, John R. **Fetal Research.** *Science* 246(4931): 775-79, 10 November 1989.

This article reviews some applications of fetal research and fetal tissue research. Benefits featured include the development of vaccines, advances in prenatal diagnosis, detection of malformations, assessment of safe and effective medications, and the development of *in utero* surgical therapies. Fetal tissue research enhances vaccine development, helps to identify risk factors and toxicity levels in drug production and the development of cell lines, and provides a source of fetal cells for ongoing transplantation trials.

Mahowald, Mary B. **Fetal Tissue Transplantation: An Update.** In: **BIOMEDICAL ETHICS REVIEWS 1991**, ed. James Humber and Robert Almeder, pp. 101-21. Totowa, NJ: Humana Press, 1991.

Mahowald describes a forum on fetal tissue and abortion held in Cleveland in 1986. After analyzing various points of view, she concludes that differing ethical frameworks espoused by various policy makers supported different ethical guidelines for the use of fetal tissue in transplantation.

McCullagh, Peter. **THE FOETUS AS TRANS-**

**PLANT DONOR: SCIENTIFIC, SOCIAL AND ETHICAL PERSPECTIVES.** New York: Wiley, 1987. 215 p.

Australian immunologist McCullagh provides a solid foundation for understanding the techniques and intricacies of fetal tissue transplants.

McCullagh, Peter. **Some Ethical Aspects of Current Fetal Usage in Transplantation.** In: **ETHICS AND LAW IN HEALTH CARE RESEARCH**, ed. Peter Byrne, pp. 25-43. New York: Wiley, 1990.

McCullagh argues that to make a decision on the ethics of fetal tissue transplants, one needs to gather accurate data and consider many aspects of the procedure. He suggests that we should look at the whole picture, and not focus on one feature of the dilemma of using aborted fetal tissue.

Nolan, Kathleen. **‘Genug ist Genug’: A Fetus Is Not a Kidney.** *Hastings Center Report* 18(6): 13-19, December 1988.

Nolan tries to balance the threat to our values and our social ethos by transplantation of tissue from fetal cadavers against the benefits to be gained from doing so. She recommends requiring restraints that can prevent harmful normative and attitudinal shifts in the perceived value of the aborted fetus, yet permit pursuit of medical benefits for those desperately in need.

Ramsey, Paul. **THE ETHICS OF FETAL RESEARCH.** New Haven: Yale University Press, 1975. 104 p.

In this slim volume on fetal research, Princeton theologian Ramsey draws a picture of the early history of experimentation on fetuses and on fetal remains. He describes the development and ramifications of early public policy in Britain and the United States.

Robertson, John A. **Fetal Tissue Transplants.** *Washington University Law Quarterly* 66(3): 443-98, 1988.

Robertson examines the key ethical, legal and policy issues presented by fetal tissue transplants, commenting that once again, medical innovation has challenged ethical norms and social practices.

Sladek, John R., and Shoulson, Ira. **Neural Transplantation: A Call for Patience Rather Than Patients.** *Science* 240(4858): 1386-88, 10 June 1988.

In the wake of the single unconfirmed report of dramatic improvement in two Mexican Parkinson’s patients, many researchers are anxious to attempt fetal tissue transplantation, but the authors advise a more cautious course. Citing extensive data from experimental transplants conducted as early as 1944, Sladek and Shoulson suggest waiting until a sufficient number of animal studies have been performed before researchers experiment on human patients.

Thorne, Emmanuel D. **Regulating Commerce in Fetal Tissue.** *Society* 26(1): 61-63, November/December 1988.

Economist Thorne warns that unless care is taken by the government and nonprofit tissue banks, there is vast potential for abuse in the procurement of tissues for donation.

U.S. Congress. Office of Technology Assessment. **NEURAL GRAFTING: REPAIRING THE BRAIN AND SPINAL CORD.** Washington, DC: U.S. Government Printing Office, September 1990. 193 p.

The Congressional Office of Technology Assessment (OTA) argues for further research and evaluation before neural grafting — transplanting tissue into the brain or spinal cord — can be adapted for general therapeutic use. OTA touches upon a policy issue in the federal regulation of the use of fetal tissue — the resultant regulation of new surgical practices and medical techniques. The report offers suggested congressional actions pursuant to neural grafting.

Vawter, Dorothy E.; Kearney, Warren; Gervais, Karen G.; Caplan, Arthur L.; Garry, Daniel; and Tauer, Carol. **THE USE OF HUMAN FETAL TISSUE: SCIENTIFIC, ETHICAL, AND POLICY CONCERNS — A REPORT OF PHASE I OF AN INTERDISCIPLINARY RESEARCH PROJECT CONDUCTED BY THE CENTER FOR BIOMEDICAL ETHICS.** Minneapolis: Center for Biomedical Ethics, University of Minnesota, January 1990. 303 p.

A thorough study by researchers at the Univer-

sity of Minnesota's Center for Biomedical Ethics, this is a report of an on-going interdisciplinary research project. The report provides clinical background on applications for fetal tissue, describes sources of fetal tissue and guidelines for determination of fetal death. Laws and regulations guiding such research are highlighted, as are procurement and distribution of fetal tissue. Finally, the report presents various ethical frameworks supporting the use of fetal tissue, discusses informed consent to donate tissue, and outlines arguments of complicity or legitimization to the use of fetal tissue.

#### IV. LEGAL & POLICY ISSUES

Annas, George J., and Elias, Sherman. **The Politics of Transplantation of Human Fetal Tissue.** *New England Journal of Medicine* 320(16): 1079-82, 20 April 1989.

Attorneys Annas and Elias examine the ethical concerns and the political pressure surrounding the NIH moratorium, and the ensuing Human Fetal Tissue Transplantation Research Panel Report. The panel concluded that, while it is morally relevant that the fetuses are obtained from elective abortions, fetal tissue research is acceptable public policy because abortion is legal and the research is intended to achieve significant medical goals. Other recommendations of the panel included separation of the decision to abort from that to donate the tissue; anonymity between donor and recipient; and informed consent of the pregnant woman.

Bopp, James, and Burtchaell, James T. **Fetal Tissue Transplantation: The Fetus as Medical Commodity.** *This World* 26: 54-79, Summer 1989.

The text of this article is one of the dissenting opinions of the Human Fetal Tissue Transplantation Research Panel of the NIH. The authors question whether abortion is dissociable from fetal research and whether allowing tissue donation will act as an incentive to abort in the future. They argue against the use of aborted tissue because the research is morally tainted by its complicity in the abortion act, just as the use of Nazi research data is morally unacceptable to these commentators.

Bregman, Jenn Swenson. **Conceiving to Abort and Donate Fetal Tissue: New Ethical Strains in the Transplantation Field — A Survey of Existing Law and a Proposal for Change.** *UCLA Law Review* 36(6): 1167-1205, 1989.

Bregman offers a proposed amendment to California law that would proscribe the act of conceiving a fetus with the goal of aborting it and using the resulting tissue to aid a loved one. While most clinicians have argued that fetal tissue does not have to be as closely matched as other tissue, this prospect raises concerns among many.

Childress, James F. **Ethics, Public Policy, and Human Fetal Tissue Transplantation Research.** *Kennedy Institute of Ethics Journal* 1(2): 93-121, June 1991.

Childress describes the deliberations of the Human Fetal Tissue Transplantation Research Panel as it attempted to reach a consensus on the use of aborted fetuses. He explores various arguments for and against the use of fetal tissue for transplantation research, following elective abortion, and for and against the use of federal funds for such research. He critically examines charges that such research, especially with federal funds, would involve complicity in the moral evil of abortion, would legitimate abortion practices, and would provide incentives for abortions. Finally, Childress considers whether the donation model is appropriate for the transfer of human fetal tissue, and whether the woman who chooses to have an abortion is the appropriate donor of the tissue.

Danis, Mark W. **Fetal Tissue Transplants: Restricting Recipient Designation.** *Hastings Law Journal* 39(5): 1079-1107, July 1988.

Danis proposes that the Uniform Anatomical Gift Act be amended to prevent parents from designating recipients in case of elective abortion. He feels this is not a violation of the constitutional right to privacy, and would support the state's legitimate interest in preventing the exploitation of women.

Donovan, Patricia. **Funding Restrictions on Fetal Research: The Implications for Science and Health.** *Family Planning Perspectives* 22(5): 224-31, September/October 1990.

Donovan presents a picture of American scientists losing the race against fatal diseases, and not remaining competitive with scientists in other countries who are able to use aborted fetal tissue in their research. She states that the government has severely hampered research involving fetuses and embryos, not because of a conviction that such studies lack scientific merit, but because of the politics of abortion.

Fletcher, John C., and Ryan, Kenneth J. **Federal Regulations for Fetal Research: A Case for Reform.** *Law, Medicine and Health Care* 15(3): 126-38, Fall 1987.

While mainly discussing research on fetuses in utero, the authors provide a summary of the developments in federal regulation of fetal research. Ryan and Fletcher propose permitting an increment of higher risk in non-therapeutic research involving first-trimester fetuses and a redefining of the term "minimal risk".

Hilts, Philip J. **Fetal-Tissue Bank Not Viable Option, Agency Memo Says: Calculations Are Skewed.** *New York Times*: A1, A9, 27 June 1992.

Hilts highlights some misgivings about the fetal tissue bank established by the Bush Administration in May of 1992. Citing an unidentified internal NIH memo, Hilts reports that the estimates of the quantity of fetal tissue that could be gathered were not accurate, and that there would not be enough tissue to supply researchers. He also enumerates some concerns about the quality of cells and tissues to be obtained from ectopic pregnancies and spontaneous abortions.

Kearney, Warren; Vawter, Dorothy E.; and Gervais, Karen G. **Fetal Tissue Research and the Misread Compromise.** *Hastings Center Report* 21(5): 7-12, September/October 1991.

Minnesota ethicists survey the effects of the 1991 House bill H.R. 2507 and critique Part 2 of the bill. Specifically, they object to the requirements that a pregnant woman sign documents stating that her decision to have an abortion is unrelated to her decision to donate fetal tissue. The authors also question the wisdom of requiring a researcher to maintain a collection of medical records that would not be treated as part of the patients' medical records, but would be subject to government audit. The signed declara-

tions seem to imply that the state has an interest in establishing the motivations of women seeking abortion, and that such motivations meet certain moral criteria.

Richard, Patricia Bayer. **Fetal Research Policy.** *In: BIOMEDICAL TECHNOLOGY AND PUBLIC POLICY*, ed. Robert Blank and Miriam K. Mills, pp. 57-72. New York: Greenwood Press, 1989.

Richard provides an overview of the public policy debate waged in the United States in the 1980s.

Robertson, John A. **Rights, Symbolism, and Public Policy In Fetal Tissue Transplants.** *Hastings Center Report* 18(6): 5-12, December 1988.

Law professor Robertson surveys the ethical, legal and policy issues surrounding the use of fetal tissue. In a systematic analysis of the problems, he concludes that ethical concerns should not prevent research on transplantation therapy for serious illnesses.

Terry, Nicholas P. **Politics and Privacy Refining the Ethical and Legal Issues in Fetal Tissue Transplantation.** *Washington University Law Quarterly* 66(3): 523-51, 1988.

Terry draws the conclusion that the debate over abortion and fetal tissue is a purposeful confusion of the issues destined to preempt any meaningful discussion of fetal tissue transplantation. The issues identified are not so much ethical concerns, but instead reflect settled positions on abortion taken for strategic reasons.

U.S. Congress. House. Committee on Energy and Commerce. Subcommittee on Health and the Environment. **NIH REAUTHORIZATION.** Hearing, 15 April 1991. Washington, DC: U. S. Government Printing Office, 1991. 643 p.

Testimony is provided by many parties interested in the Fetal Tissue Transplantation Research Bill (H.R. 1532), introduced by Henry Waxman on March 20, 1991, but never passed by the House of Representatives. Of particular interest is the testimony of Guy and Tern Walden, parents of a child who has undergone fetal tissue transplantation to treat Hurler's Syndrome, a fatal disease. Text of the bill is

included.

U.S. Congress. **NATIONAL INSTITUTES OF HEALTH REVITALIZATION AMENDMENTS OF 1992.** H.R. 2507. Washington, DC: U. S. Government Printing Office, 1992.

Passed by both houses of Congress, this bill was vetoed by President Bush on June 23, 1992. It did not have enough support to override the presidential veto. The act would have lifted the moratorium on fetal tissue transplantation and enacted all the recommendations of the NIH Human Fetal Tissue Transplantation Research Panel.

U.S. Congress. Senate. Committee on Labor and Human Relations. **FINDING MEDICAL CURES: THE PROMISE OF FETAL TISSUE TRANSPLANTATION RESEARCH.** Hearing 21 November 1991. Washington, DC: U. S. Government Printing Office, 1991. 127 p.

In another hearing on ethical and policy issues relating to fetal tissue transplantation, testimony and prepared statements are provided by numerous individuals and organizations. The bill was introduced to force the lifting of the moratorium and to establish careful safeguards and procedures. This bill also died in committee.

Vawter, Dorothy E., and Caplan, Arthur. **Strange Brew: The Politics and Ethics of Fetal Tissue Transplant Research in the United States.** *Laboratory and Clinical Medicine* 120(1): 30-34, July 1992.

Minnesota bioethicists describe the history of fetal tissue research, its regulation in the U.S., and ethical issues relating to fetal tissue transplants. The existing ban on federal funding for such research is discussed. They conclude that the true reasons for not funding such research are not based on sound ethical reasoning, but rather political expedience. They briefly touch upon the chances of a Congressional challenge to the moratorium.

Walters, LeRoy. **Ethical Issues in Fetal Research: A Look Back and a Look Forward.** *Clinical Research* 36(3): 209-14, April 1988.

Bioethicist Walters presents six major policy statements by British, American, Australian, and French committees and the recommendation of

the Council of Europe as the central focus of an article on public policy regarding fetal tissue.

## V. PHILOSOPHICAL ISSUES

Caplan, Arthur L. **Should Foetuses or Infants Be Utilized as Organ Donors?** *Bioethics* 1(2): 119-40, April 1987.

Bioethicist Caplan considers the ethical implications of utilizing abortuses and brain dead or anencephalic infants as donors, and presents an analysis of the pros and cons of using such donors. Caplan concludes that the arguments for using abortuses, anencephalics, and brain dead infants as organ and tissue donors outweigh the arguments against.

Childress, James F. **Disassociation from Evil: The Case of Human Fetal Tissue Transplantation Research.** *Social Responsibility: Business, Journalism, Law, Medicine* 16: 32-49, 1990.

Three types of association with evil are discussed — direct participatory actions, causal actions, and symbolic actions. Childress identifies the latter two as being relevant to fetal tissue research and abortion. After analyzing the philosophical dimension, Childress concludes that while the rationale for the moratorium on federal funding of fetal research in the U.S. was based on causal responsibility, the ethical analysis was flawed, and the policy should be reversed.

Jones, D. Gareth. **Fetal Neural Transplantation: Placing the Ethical Debate Within the Context of Society's Use of Human Material.** *Bioethics* 5(1): 23-43, January 1991.

Jones presents four possible positions that one might take to evaluate the ethics of fetal tissue research from aborted fetuses. He calls them: scientific pragmatism, abortion dependent, clinical benefit (abortion irrelevant) and abortion independent. Jones adopts the latter position, as it “appears to reflect the stance of most within society”. The thrust of his argument is that one may view as morally acceptable a procedure (transplantation) that would not be possible apart from what many regard as a morally unacceptable procedure (induced abortion). Basic to this thrust is a complete separation in practice between the two procedures.

Jonsen, Albert R. **Transplantation of Fetal Tissue: An Ethicist's Viewpoint.** *Clinical Research* 36(3): 215-19, April 1988.

A member of the 1975 DHEW Commission that established the first U.S. guidelines on fetal research, Jonsen describes his viewpoint on the issue. He is of the opinion that the use of cadaver fetal tissue, regardless of the suspect permission of the woman, meets the test for ethical probity.

Mahowald, Mary B.; Silver, Jerry; and Ratcheson, Robert A. **The Ethical Options in Transplanting Fetal Tissue.** *Hastings Center Report* 17(1): 9-15, February 1987.

The authors argue that whether or not abortion is morally justified, use of human fetal tissue for research or therapy is justified in certain circumstances. The ethical rationale, both for allowing transplantation of fetal tissue and for placing certain limitations, is based on respect for autonomy and a balancing of harms and benefits that gives priority to those most affected.

Miller, Richard B. **On Transplanting Human Fetal Tissue: Presumptive Duties and the Task of Casuistry.** *Journal of Medicine and Philosophy* 14(6): 617-40, December 1989.

Miller asks two broad moral questions with regard to the use of fetal tissue: Is there a framework from other moral paradigms to assist in ethical debates about the transplantation of fetal tissue? Does the use of fetal tissue entail cooperation in abortion? He develops a theoretical framework by combining the paradigm of just-war reasoning with canons governing the use of cadaverous tissue. This paradigm creates safeguards that allow fetal tissue to be procured without the taint of association with abortion. For Miller, it is important to make the distinction between intending and foreseeing a moral misdeed.

## VI. RELIGIOUS & MORAL ISSUES

Barry, Robert, and Kesler, Darrel. **Pharoah's Magicians: The Ethics and Efficacy of Human Fetal Tissue Transplants.** *Thomist* 54(4): 575-607, October 1990.

Barry and Kesler critique the scientific and ethical foundations of proposed fetal tissue

research, and support the federal moratorium on funding for fetal research. First, they feel there have not been enough long-term therapeutic successes to warrant federal funding. They argue that there are alternative techniques and therapies that would offer at least as much hope as do fetal tissue transplants. They also see serious problems with informed consent to donate, and a woman's authority to donate tissue.

Bleich, J. David. **Fetal Tissue Research: Jewish Tradition and Public Policy.** *Tradition: A Journal of Orthodox Jewish Thought* 24(4): 69-90, Summer 1989.

In a bibliographic essay, Rabbi Bleich provides a survey of Jewish perspectives of fetal tissue transplantation. He summarizes his dissenting opinion in the NIH Human Fetal Tissue Transplantation Research Panel Report.

Botros, Sophie. **Abortion, Embryo Research and Fetal Transplantation: Their Moral Interrelationships.** In: **MEDICINE, MEDICAL ETHICS AND THE VALUE OF LIFE**, ed. Peter Byrne, pp. 47-79. New York: Wiley, 1990.

British ethicist Botros uses Immanuel Kant's philosophy to analyze the morality of using aborted fetal tissue in research.

Burtchaell, James Tunstead. **The Use of Aborted Fetal Tissue in Research and Therapy.** In *his: THE GIVING AND TAKING OF LIFE: ES-SAYS ETHICAL*, pp. 155-87. Notre Dame, IN: University of Notre Dame Press, 1989.

Burtchaell focuses on respect for the dead, and specifically on whether a woman consenting to abortion has a right to consent to fetal tissue donation. He argues that the way we treat bodies is an indication of the respect we hold for the dead person. "The decision to abort is an act of such violent abandonment of the maternal trust that no further exercise of such responsibility is admissible" (p. 161). Burtchaell also concentrates on the moral complicity problem, rejecting any arguments that the ends of fetal research justify the means used to succeed. He remains convinced that successful research using aborted tissue will increase the number of abortions.

Desmond, Joan Frawley. **Should We 'Harvest' Fetal Tissue?** *Human Life Review* 14(1): 71-78,

Winter 1988.

After presenting an overview of research using fetal tissue in 1988, Desmond expresses concerns over the connection between abortion and the use of aborted fetal tissue. She wonders whether fetal implants, physicians and hospitals are actually encouraging deliberate abortions to maintain a ready supply of tissue. She is particularly concerned about the vulnerability of non-viable living fetuses.

Mahowald, Mary B. **Placing Wedges Along a Slippery Slope: Use of Fetal Neural Tissue for Transplantation.** *Clinical Research* 36(3): 220-22, April 1988.

Mahowald asks whether, just because we have the technical expertise to transplant fetal tissue, we should do so. She concludes that while it is possible to create enough safeguards to make fetal tissue research ethically acceptable, a “degree of moral aversion ought to remain as a wedge for helping to maintain moral balance along the slippery slope” (p. 222).

Post, Stephen G. **Fetal Tissue Transplant: The Right to Question Progress.** *America* 164(1): 14-16, 12 January 1991.

Case Western Reserve ethicist Post argues that the public has a right to question medical progress that may be moral regress. He charges that the bioethics “establishment” too quickly accepts the beneficence arguments in favor of fetal tissue use and aligns itself with the medical establishment. While Post does not argue that fetal tissue research will increase the number of abortions, he is apprehensive over the strengthening of the relationship between abortion clinics, biomedical researchers and the federal government.

Strong, Carson. **Fetal Tissue Transplantation: Can It Be Morally Insulated from Abortion?** *Journal of Medical Ethics* 17(2): 70-76, June 1991.

Strong disagrees with the NIH Human Fetal Tissue Transplantation Research Panel that tissue use is ethically acceptable because it can be morally insulated from the issue of abortion. He argues that whatever wrong is involved in using fetal tissue from aborted fetuses must be balanced against the benefits for patients, and on this basis, fetal tissue transplantation can be

morally justified.

## VII. ADDITIONAL READINGS

Adam, Peter A. J., *et al.* **Oxidation of Glucose and D-B-OH-Butyrate by the Early Human Fetal Brain.** *Acta Paediatrica Scandinavica* 64(1): 17-24, January 1975.

Anderson, Christopher. **Groups Sue to End Fetal Tissue Ban.** *Nature* 359(6398): 761, 29 October 1992.

Baron, Charles H. **Fetal Research: The Question In the States.** *Hastings Center Report* 15(2): 12-16, April 1985.

Cameron, Nigel M. de S. **Man as Experimental Subject: Embryo Research and Its Context.** In: **MEDICINE IN CRISIS: A CHRISTIAN RESPONSE**, ed. Ian L. Brown and Nigel M. de S. Cameron, pp. 41-55. Edinburgh: Rutherford House Books, 1988.

Canada. Law Reform Commission. **BIOMEDICAL EXPERIMENTATION INVOLVING HUMAN SUBJECTS: WORKING PAPER 61.** Ottawa: The Commission, 1989. 142 p.

Chamberlain, Geoffrey. **An Artificial Placenta.** *American Journal of Obstetrics and Gynecology* 100(5): 615-26, 1 March 1968.

Fichera, G. **Implanti Omoplastici Feto-umani Nei Cancro e Nei.** *Tumori* 14: 434, 1928.

Hamilton, David P. **Fetal Tissue Fight.** *Science* 255(5049): 1199, 6 March 1992.

Hellegers, André E. **Fetal Research.** In: **ENCYCLOPEDIA OF BIOETHICS**, vol.2, ed. Warren T. Reich, pp. 489-493. New York: Free Press, 1978.

Hilts, Philip J. **Citing Abortion, U.S. Extends Ban on Grants for Fetal Tissue Work.** *New York Times*: A1, B19, 2 November 1989.

Hilts, Philip J. **Fetus-to-Fetus Transplant Blocks Deadly Genetic Defect, Researchers Say.** *New York Times*: B14, 21 November 1991.

Horan, Dennis J. **Fetal Experimentation and Federal Regulation.** *Villanova Law Review* 22(2): 325-56, January 1977.

Jones, Deborah. **Halifax Hospital First in Canada to Proceed with Controversial Fetal-Tissue Transplant.** *Canadian Medical Association Journal* 146(3): 389-91, 1 February 1992.

Kingman, Sharon; Yamauchi, Masaya; Dorozynski, Alexander; Swan, Norman; *et al.* **Fetal Tissue Research Around the World.** *British Medical Journal* 304(6827): 591-93, 7 March 1992.

Kolata, Gina. **Evidence Is Found that Fetal Tissue Transplants Can Ease a Brain Disease.** *New York Times*: B11, 7 May 1992.

Kolata, Gina. **Fetal Tissue Seems to Aid Parkinson Patient.** *New York Times*: A1, A20, 2 February 1990.

Kolata, Gina. **Success Reported Using Fetal Tissue to Repair a Brain.** *New York Times*: A1, B18, 26 November 1992.

Lebacqz, Karen. **Reflections on the Report and Recommendations of the National Commission: Research on the Fetus.** *Villanova Law Review* 22(2): 357-66, January 1977.

Levine, Robert J. **The Impact on Fetal Research of the Report of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research.** *Villanova Law Review* 22(2): 367-83, January 1977.

Lindvall, Olle, *et al.* **Human Fetal Dopamine Neurons Grafted Into Striatum In Two Patients with Severe Parkinson's Disease: A Detailed Account of Methodology and a Six-Month Follow Up.** *Archives of Neurology* 46: 615-31, June 1989.

Reinikainen, Pekka. **A Debate on Fetal Tissue Use in Finland.** *Ethics and Medicine: A Christian Perspective* 5(3): 36-37, Winter 1989.

Spalding, BJ. **Fetal-Tissue Research: Abortion Politics Slow Advances to a Crawl.** *Biotechnol-*

*ogy* 9(7): 615-18, July 1991.

Terry, Nicolas P. **"Alas! Poor Yorick," I Knew Him Ex Utero: The Regulation of Embryo and Fetal Experimentation and Disposal in England and the United States.** *Vanderbilt Law Review* 39(3): 419-70, April 1986.

Toner, Robin. **Clinton Orders Reversal of Abortion Restrictions Left by Reagan and Bush: Big Policy Change—Allows Counseling and Research Financing as Thousands Protest.** *New York Times*: 1, 10, 23 January 1993.

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U.S. Department of Health, Education, and Welfare, Office of the Secretary. **Protection of Human Subjects: Fetuses, Pregnant Women and In Vitro Fertilization.** *Federal Register* 40(154): 33526-52, 8 August 1975.

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Vawter, Dorothy, and Gervais, Karen G. **Government by Myth: The U.S. Moratorium on Fetal Tissue Transplantation Research.** *Conscience* 13(2): 31-32, Spring 1992.

Walters, LeRoy. **Fetal Research and the Ethical Issues.** *Hastings Center Report* 5(3): 13-18, June 1975.

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