History of Fetal Tissue Research and Transplants

Human fetal tissue research has gone on for decades. However, the success of fetal tissue transplants has been meager at best, and ethically-derived alternatives exist and are coming to dominate the field.

Proponents of using fetal tissue from induced abortion point to three areas in claims of the need for harvesting tissue:
- Transplantation to treat diseases and injuries
- Vaccine development
- Basic biology research

Fetal Tissue Transplantation: The first recorded fetal tissue transplants were in 1921 in the UK, in a failed attempt to treat Addison’s disease,\(^1\) and in 1928 in Italy, in a failed attempt to treat cancer.\(^2\) The first fetal tissue transplant in the U.S. was in 1939, using fetal pancreatic tissue in an attempt to treat diabetes. That attempt also failed, as did subsequent similar fetal tissue transplants in 1959. Between 1970 and 1991 approximately 1,500 people received fetal pancreatic tissue transplants in attempts to treat diabetes, mostly in the former Soviet Union and the People’s Republic of China. Up to 24 fetuses were used per transplant, but less than 2% of patients responded.\(^3\) Today, patients take insulin shots and pharmaceuticals to control their diabetes, and adult stem cell transplants have shown success at ameliorating the condition.\(^4\)

Between 1960 and 1990, numerous attempts were made to transplant fetal liver and thymus for various conditions. According to one review, “the clinical results and patient survival rates were largely dismal.”\(^5\) Conditions such as anemias and immunodeficiencies, for which fetal tissue attempts largely failed, are now treated routinely with adult stem cells, including umbilical cord blood stem cells,\(^6\) even while the patient is still in the womb.\(^7\)

Note that fetal tissue has been taken in a number of cases from fetuses at developmental ages where fetal surgery is now used to correct problems and save lives, and at stages where science now demonstrates that the unborn fetus can feel pain.

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Between 1988 and 1994, roughly 140 Parkinson’s disease patients received fetal tissue (up to six fetuses per patient), with varying results.\(^8\) Subsequent reports showed that severe problems developed from fetal tissue transplants. One patient who received transplant of fetal brain tissue (from a total of 3 fetuses) died subsequently, and at autopsy was found to have various non-brain tissues (e.g., skin-like tissue, hair, cartilage, and other tissue nodules) growing in his brain.\(^9\)

In 2001, the first report of a full clinical trial\(^{10}\) (funded by NIH) using fetal tissue for Parkinson’s patients was prominently featured in the *New York Times*,\(^{11}\) with doctors’ descriptions of patients writhing, twisting, and jerking with uncontrollable movements; the doctors called the results "absolutely devastating", "tragic, catastrophic", and labeled the results “a real nightmare.”

A second large, controlled study published in 2003 showed similar results (funded by NIH), with over half of the patients developing potentially disabling tremors caused by the fetal brain tissue transplants.\(^{12}\) The results of these two large studies led to a moratorium on fetal tissue transplants for Parkinson’s. Long-term follow-up of a few of the patients in these large studies showed that even in fetal tissue that grew in patients’ brains, the grafted tissue took on signs of the disease and were not effective.\(^{13}\) In contrast, adult stem cells have shown initial success in alleviating Parkinson’s symptoms.\(^{14}\)

A recent 2009 report emphasizes the instability and danger of fetal tissue transplants. A patient with Huntington’s disease was recruited into a study (funded by NIH) in which she had fetal brain cells injected into her brain. She did not improve, and instead developed in her brain a growing mass of tissue, euphemistically termed “graft overgrowth” by the researchers.\(^{15}\)

Disastrous results for patients are seen not only with fetal tissue but also with fetal stem cells. In a recent example, a young boy developed tumors on his spine, resulting from fetal stem cells injected into his body.\(^{16}\)

In contrast, a recent review found that as of December 2012, over one million patients had been treated with adult stem cells.\(^{17}\) The review only addressed hematopoietic (blood-forming) adult stem cells, not other adult stem cell types and transplants, so this is a significant underestimate of the number of patients who have benefitted from adult stem cell therapies.

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\(^{12}\) Olanow CW *et al.*, A Double-blind Controlled Trial of Bilateral Fetal Nigral Transplantation in Parkinson’s Disease, *Ann Neurol* 54, 403, 2003
\(^{14}\) See, e.g., Lévesque MF *et al.*, Therapeutic microinjection of autologous adult human neural stem cells and differentiated neurons for Parkinson’s disease: Five-year post-operative outcome, *The Open Stem Cell Journal* 1, 20, 2009
\(^{15}\) Keene CD *et al.*, A patient with Huntington’s disease and long-surviving fetal neural transplants that developed mass lesions, *Acta Neuropathol* 117, 329, 2009
Vaccine development: Early attempts at growing virus used cultures of mixed human fetal tissue, not individual cells, e.g., for growth of poliovirus, 1949. Later, poliovirus was produced in human fetal cell lines (WI-38, 1961, fetal female lung; MRC-5, 1966, fetal male lung). Now most manufacturers of polio vaccine use other cell types including monkey cells, and most do not use fetal cells.

The first individual human cell (not tissue) grown in the lab was a tumor cell in 1951, because the growth character of cancerous cells made them easiest to grow. In the 1960’s and 1970’s, cell culture work operated under an assumption that younger cells were better, grew faster, lived longer, so fetal cells obtained from abortion were used. These cells adapted to lab culture and continued to grow, becoming known as a “cell line” because they developed as a lineage from different, specific cells grown in the lab. A few human fetal cell lines (WI-38, MRC-5) are still in use for some vaccine production. However, newer cell lines and better culture techniques make this reliance on fetal cells an antiquated science. In addition, the CDC and other leading medical authorities have noted that “No new fetal tissue is needed to produce cell lines to make these vaccines, now or in the future.”

Basic biology research: Broad, undefined claims continue to be made that fetal tissue and fetal cells are needed to study basic biology, development, disease production, or other broad study areas. However, this still relies on antiquated science and cell cultures. Current, progressive alternatives such as induced pluripotent stem (iPS) cells provide an unlimited source of cells, which can be produced from tissue of any human being, without harm to the individual donor, and with the ability to form virtually any cell type for study and modeling or potential clinical application. Stem cells from umbilical cord blood also show significant potential not only as laboratory models, but also have unique advantages for clinical applications and are already treating patients for numerous conditions.

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