

TRANSPLANTATION: BIOMEDICAL AND ETHICAL CONCERNS RAISED BY THE CLONING AND STEM-CELL DEBATE

by *Gayle E. Woloschak*

Abstract. Transplantation is becoming an increasingly more common approach to treatment of diseases of organ failure, making organ donation an important means of saving lives. Most world religions find organ donation for the purpose of transplantation to be acceptable, and some even encourage members to donate their organs as a gift of love to others. Recent developments, including artificial organs, transplants from nonhuman species, use of stem cells, and cloning, are impacting the field of transplantation. These new approaches should be discussed with bioethical considerations in mind, particularly the notion of human beings as a unity of body and spirit.

Keywords: biomedical ethics; human cloning; organ transplantation; science and religion; stem-cell research; tissue transplantation; xenotransplantation.

Transplantation is the general procedure of implanting a functional organ from one person to another. This can range from simple procedures such as blood or platelet transfusions to kidney transplants from a living donor to more complicated multi-organ transplants (heart and lung, for example) from a cadaver. In the United States transplants require the willingness of the recipient to have a transplant, the health of the recipient (which must be generally good including no history of cancer), and the availability of appropriate tissues for transplantation into that particular individual.

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Bone-marrow transplants began in the United States in 1958, but they were relatively unsuccessful until mechanisms for tissue rejection were delineated, first in mouse model systems and then in humans, in the 1970s and 1980s. All transplants, whether of single cells (like transfusions) or of whole organs (such as kidney, lung, or heart) require some sort of matching procedure to ensure that proteins on the surface of the cells from the donor are compatible with those from the recipient. Failure to match these proteins can result in either (1) death from graft-versus-host response, when the graft (transplanted tissue) attacks the host and cripples immune defenses causing organ failure, or (2) host rejection of the transplant, which results in the failure of the transplanted organ. Matching for blood transfusion involves ensuring that the blood type from donor to recipient is the same, while matching for full organ transplants can involve examining multiple proteins on the surface of lymphocytes and tissues to ensure compatibility.

Once the transplant has taken place, particularly in the case of whole organ transplants, a battery of immunosuppressive drugs is given to the recipient to diminish host immune responses against the transplanted tissue and thus improve the likelihood of success of the transplant and survival of the recipient. These drugs include combinations of steroids such as hydrocortisone and prednisone and more specific inhibitors of active immune responses such as cyclosporin A. In most cases, these drugs permit the survival of the host and transplant together (Little and Storb 2002).

TRANSPLANTATION AND RELIGION

Most religions in the United States consider the decision for transplantation to be an individual one that is a matter of conscience for both the donor (or donor's family) and the recipient. Many religions accept transplantation as a valid means of preserving life and consider organ donation an act of neighborly love and charity. One exception to this is the Shinto faith, which considers the dead body to be impure and dangerous and yet at the same time quite powerful; among the Shintos of Japan it is generally difficult to obtain consent for transplantation from bereaved families because it is considered a means of injuring the dead. Christian, Muslim, Jewish, and Buddhist scholars have all noted a permissiveness on the part of their religions for organ donation and transplantation. A few Christian theologians have opposed heart transplantation because the heart is considered to be the "seat of emotions," but this is a minority view not shared by the broader Christian community. It should be noted that organ donation for survival of a person should not be confused with cadaver donation to be used for medical research. This latter type of whole-body donation is not as well favored by religious communities as is donation to help save the life of another.

The medical ethics of transplantation have been shaped by the views expressed by the major American religions. The general attitude of the medical community to organ transplantation is that permission for the organ donation must be free and unconstrained and that respect for the body should be maintained even in death. It is not permissible to hasten death in order to harvest the organs, but it is allowed for doctors to keep a body functional to improve the timing for transplantation, since most organs remain viable for only hours once outside the body.

Decisions about who is eligible for transplantation and who will be the next to receive a particular organ are complicated. While it is clear that recipients must be in generally good health, the attitude of the medical community has been to have each organ go to the person for whom it is most likely to save life or improve its quality. The organ procurement team is distinct from the treatment team, and thus there is no relationship between medical treatment of a patient and whether his or her tissues will be available for transplant. Many myths exist about organs going to the wealthy or to those with special social status, but these have not been found to have substance. Factors that influence organ allocation include severity of illness, length of time on the organ donation list, blood type, and other medical factors. How each of these factors is weighed is carefully balanced to ensure maximum use of tissues for saving life.

TRANSPLANTATION AND MODERN ADVANCES

One of the first advances attempted in the field of transplantation was the development of artificial organs, particularly the Jarvik heart in 1983. The purpose of this and other artificial hearts was not to replace transplantation but rather to provide additional time for obtaining appropriate hearts for transplantation. All patients who had received these Jarvik hearts died, but some newer types of artificial hearts are being tested. Artificial blood has been developed with some success, but availability of blood has never been a great limitation except on the battlefield and in unusual circumstances.

Xenotransplantation is the transplantation of tissues from one species to another. The first reported transplantation from another species into humans was the case of Baby Fae, in which a baboon heart was transplanted into a human; Baby Fae survived twenty days before massive organ failure resulted from the graft rejection. Since that time, several projects have been undertaken including transplantation of pig liver and pig hearts into humans. Projects are currently underway at Loma Linda University (California), the University of Pittsburgh, and Duke University to continue such xenotransplantation efforts. Nevertheless, at this time, there is a moratorium on all such xenotransplantation in Europe because it is considered to be a procedure with little likelihood of success using the most advanced medical treatment available today. The problems associated with

the mechanics of getting a tissue from another species to interface with a human and the overwhelming problems of tissue rejection must be overcome before such attempts become reasonable (Platt 2002; Strain and Neuberger 2002; Petit-Zeman 2001).

Stem-cell research has been touted as the cure for many diseases including devastating neurologic disorders such as Parkinson's Disease and Alzheimer's Disease. The concept behind this notion is that the implantation of immature stem cells into a person can lead to the development of new cells and tissues that could function in place of existing dysfunctional or dying cells. Stem-cell transplantation has been used successfully for the treatment of leukemia through the use of bone marrow transplants since the 1980s. The recent hype about stem-cell research comes from the use of stem cells from somatic cells such as neural tissues or from fetal tissues for the treatment of many diseases of aging or problems that result from injury to nervous tissue (such as the spinal cord). To date, the success of these procedures has been limited because the implanted stem cells have been shown to have moderate ability to replace aged tissues. Nevertheless, as the number of tissues available for such studies increases, some success stories may be observed (Griffith and Naughton 2002; Noble 2002).

In recent months, much news time has been devoted to the discussion of the cloning of humans and the possible use of human clones as sources of transplantable tissue. While there has been a moratorium on the cloning of humans in the United States for projects using federal funds, private funds in the U.S. and funding abroad can be used for cloning endeavors; in fact, several companies and individual investigators have stated their intention to begin cloning humans in the near future. There are several concerns about the cloning of humans that should be addressed before such experiments are attempted: (1) While there have been experimental reasons to clone animals (e.g., information that can be gained about the importance of genes vs. environment), there is very little that can be learned about humans by cloning. It is not clear why humans should be cloned, except perhaps for egotistical reasons. (2) In general, cloning has not been shown to be safe for animals. Most of the cloned animals develop premature aging syndromes with neurological disorders and shorter life spans, and such is likely to be the case for humans as well. Ethical review boards are in place to prohibit experimentation on humans that is not reasonable and safe; such review boards should not view cloning as a safe and reasonable practice for humans. (3) Arguments about developing clones as a source of tissues for transplantation are especially worrisome, because they involve the development of a subclass of human beings (or perhaps just "subhumans") who would not have choices about whether they wanted to give up their organs for transplantation or not (Gurdon and Colman 1999; Brock 2002; Check 2002). One must question whether every experiment and every study should be done simply because it can be done (Breck 1998).

CONCLUSIONS

Transplantation continues to be a remarkably successful means of treating diseases of cell or organ failure. Such developments as artificial organs, xenotransplantation, human cloning, and use of stem cells may be of limited value to the transplantation field and should be reviewed from ethical and moral perspectives. Human beings are a unity of body and spirit, and efforts must be made to maintain this unity. While transplantation seeks to keep the human being alive as body and spirit by preserving the body, actions that denigrate the humanity of the recipient through the use of approaches that will always fail (thus treating a recipient as an experimental subject) or of the donor (for example, a clone that will be regarded as less than human) break this unity apart (Harakas 1982). Saint Symeon the New Theologian spoke of the unity of body and spirit in his Hymn 31:

How is it, tell me, that from clay, the bones and sinews,
 The flesh, the veins, the skin, the hair,
 The eyes and ears, the lips and tongue,
 The vocal organs, and the hardness of the teeth
 Form clearly by the spirit speech articulate?
 From matter dry and matter moist, from hot and cold
 He formed me as a living thing, by a mingling of opposites.
 (Keselopoulos 2001, 39)

Furthermore, committing or accepting actions that denigrate humanity creates a rift between us and our intended role in the creation; one thing that sets humanity apart from the remainder of creation is responsibility. We humans are meant to take responsibility for ourselves, for each other, for our children, for the world in which we live, for the world that we refashion, for the cosmos around us, for our actions and inactions, for our good deeds and bad deeds. Taking responsibility is human, and to not take it is to be less than human. In the ongoing debate about cloning, about xenotransplantation, and about other related biomedical research, we must not lose sight of this responsibility to ourselves, to each other, and to our world.

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