Should xenotransplantation be allowed?

Xenotransplants have a long history in modern medicine. In late 1963 and early 1964, a team from Tulane University led by Keith Reemtsma, MD, did kidney transplants from chimpanzees into six patients, and one of them survived for nine months subsequent to the transplant. By 1974, including investigational surgeries performed by Thomas Starzl, MD, of University of Pittsburgh, around 20 patients had received xenotransplants. In this essay, I will examine if xenotransplantation should be allowed.

Xenotransplantation is the removal of cells, tissue or organs from one organism and then implanted into another organism (Nuffield, 1996). A xenograft is a surgical graft of tissue between different species. The most liable source of transplantable organs is currently the pig. A modern technique from molecular biology that is now used to alter a donor organ is referred as gene knockout technology. Specific genes are inactivated through this way. Hypothetically, gene knockout technique can eliminate genes for antigens or other factors that induces rejection from animal organs and tissues permanently. Scientists are trying to make the human immune system accept transplants of pig organs by genetic engineering to modify the pig. Research teams are trying to delete specific pig genes or inserting human genes to modify pig cells into a less foreign matter to the immune system by accessible laboratory techniques. The manufacture of transgenic organs is an approach to shield animal organs from rejection by humans without need for immunosuppression. With the aid of transgenic technology, genes that can prevent rejection are added. In transgenic modification, either all the animal cells that contain the foreign gene which is incorporated firmly into their genome expressing the protein, or only chosen cells contain

these genes due to the presence of promoters that are precise for a single cell type (Levinsky, 1996).

There is an increase in number of patients with organ failures but an insufficient supply of organs, creating a gap between organ supply and demand (Uncaged, 1999). Considering that this imbalance has resulted in rising waiting times and number of deaths of patients on waiting lists, xenotransplants should be allowed. (Levinsky, 1996)

Other than that, researchers also have studied transplanting animal cells for therapeutic effect. Suzanne Ildstad, who is the director of Institute for Cellular Therapeutics in Louisville, Kentucky does bone-marrow transplantation research. In year 1995, she performed a baboon bone-marrow transplant into Jeff Getty, a man infected with HIV and therefore has AIDS. Bone marrow makes immune system cells. The main aim was to shield Getty from infection by replacing his collapsing immune system with a HIV-proof baboon immune system. Getty is still alive even though the baboon cells functioned for merely two weeks (Agnew, 1999).

Besides that, enough animals could be reared to supply sufficient organs and tissue to surmount the current shortage of human organs and tissue for transplantation. Pigs are the considered the liable candidates because they are highly tamed, have large amount of litters, grow rapidly to maturity and their organs are the correct size. They can be bred in sterile environments, and this decreases the chances of transmission of certain pig diseases to humans. Successful xenotransplantation of genetically modified organs and tissue would eradicate the need for the careful matching of the organ or

tissue with the recipient, necessary in transplants between human beings in order to lessen rejection by the immune system. This predominantly benefits people who have difficulties finding compatible organs and tissue (Nuffield, 1996).

The potential benefits are obvious, but the harm that it also brings cannot be overlooked. The human immune system consists of an intricate network of defense against disease and other foreign substances. When an organ from an animal that is evolutionarily remote is introduced, the human immune system shows a violent response. In hyperacute rejection, antibodies that appear pre-primed to attack tissues of another species convene the complement cascade, a range of proteins in the blood which attacks the interior walls of the transplant’s blood vessels, causing organ rejection within hours or even minutes. Patients died either due to graft rejection or because of infections resulting from the use of large doses of immunosuppressive drugs (Agnew, 1999).

Animal organs may come with unwanted viruses or infectious organisms. The foremost concern involves porcine endogenous retroviruses (PERVs) because they are able to infect human cells in-vitro and cannot be eliminated from the source animal’s genome. In the more notable research projects, three classes of infectious type C PERVs have displayed its ability of infecting human cells. PERVs can infect both pig and human cell lines. This shows that PERVs is most likely to replicate in pig transplants and human cells in immunosuppressed xenograft recipients. Scientists believe that there is an intolerable threat to public health related with xenotransplantation because of the lack of alternatives to counter risks posed by PERVs (Uncaged, 1999).

Moreover, there is a possibility of initiating a human epidemic. Zoonotic infections have the potential to expand beyond the individual and into the public. The likelihood for xenogeneic infections to be transmitted through human populations poses a public health concern. Furthermore, the risk for health care workers who interacts with the xenograft recipient is higher than for the community at large (Uncaged, 1999).

Finally, the use of animals as a source of xenotransplant organs will raise an ethical storm. The main concerns of bioethicists and animal-rights advocates are whether humans have the moral right to exploit animal organs to save human lives. The debate is further strengthened when we consider the suffering, exploitation and annihilation of animals (Nuffield, 1996).

In conclusion, xenotransplantation can solve the shortage of organ supply, minimise the need for careful matching of the organ or tissue with the recipient and also has therapeutic effect. On the contrary, it might be potentially harmful to patients through infection or rejection. Risks for zoonotic infections that can spread to the community are high and ethical issues such as exploitation of animals would be raised.

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