

Peter Bisong

Prospects and Challenges of Xenografting. Implications to Humans and the Environment

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Bibliographic information published by the German National Library:

The German National Library lists this publication in the National Bibliography; detailed bibliographic data are available on the Internet at <http://dnb.dnb.de> .

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Imprint:

Copyright © 2019 GRIN Verlag
ISBN: 9783346138484

This book at GRIN:

<https://www.grin.com/document/508576>

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XENOGRAFTING PROCEDURE: PROSPECTS AND CHALLENGES

PETER BISONG BISONG

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1. Introduction

Xenografting also called xenotransplantation is the transfer of organs, tissues and cells from species of a different kind to another. The concern of this book is on xenografting that involves, the transfer of organs and tissues from animals to humans. The use of animals as source of organs, tissues and cells for transplantation into humans has been practiced for some time now. This procedure (xenotransplantation or xenografting) started as far back as 1904-1906 with Mitt Carrel and Guthrie. They performed autogenous vein grafts, leg replantation in dogs, and the famous patch-grafts (Samdani <http://emedicine.medscape.com/article/432418-o...>). In 1906 Kidneys from goats, sheep and monkeys were transplanted into humans by Jaboulay. Also, in 1032, Neuhof transplanted a lamb kidney into a patient with mercury poisoning (Samdani website). Xenotransplantation has however, not been successful because of set-backs like; immune system rejection and the risk of introducing a novel infectious disease to humans. Few recipients of animal's organs and tissues have survived more than a few weeks and many others have died in a matter of hours or less (Hughes 18).

However, in recent times there has been an upsurge of interest once again in xenotransplantation, due to improved technologies, that have provided better immunosuppressive drugs that would aid combat immune rejection and also the development of transgenic technologies, where animals like pigs are being

genetically modified to produce organs and tissues that would be compatible with the human body. This renewed interest in xenotransplantation is also due to new researches that have shown little evidence that pigs which are main object of xenografting will not transmit new infectious organisms to humans. The interest is increased by the fact that the number of human organs and tissues available for transplants are in short supply. According to the most recent report from the United Network for Organ Sharing (UNOS) more than 107,241 Americans alone were on the waiting list for organ transplantation as at May 2010 (<http://www.unos.org/>). According to Healy, a worldwide shortage of human organs for transplantation causes about 20-35% of patients who need replacement organs to die on the waiting list (235). Xenotransplantation it is believed, would help bridge the gap between the number of patients in need of transplantation and the number of organs available.

There are therefore, three main motivations behind the recent interest in xenografting, there are

- (1) There are better immunosuppressive drugs to combat the hitherto existing problem of immune rejection by the recipient immune system.
- (2) There are better evidences showing that xenotransplantation would not lead to the introduction of a novel infectious disease to the human race.
- (3) The number of human organs available for transplantation is far too small compared to the demand.

Other factors like the financial gain that will accrue from a breakthrough in xenotransplantation and the possible fame this breakthrough would bestow on the scientists could also provide the vehicle that drives researches on xenotransplantation. The most important driver of xenotransplantation could be said to be the desire to find better treatment for the teeming patients on their dying beds. Norman Levinsky avers that the use of animal cells or tissues could be beneficial in AIDS, Parkinson's disease, diabetes, spinal cord injury, acute liver failure, psoriasis, muscular dystrophy, myocardial infection and other health conditions. The importance of xenotransplantation could therefore, not be totally and reasonably contested. Michler a medical surgeon in support of moral benefits of xenotransplantation asserts "as a cardiac surgeon, I am faced with people who die all the time. It's abhorrent. My interest in xenografts is a direct response to a tremendous problem, the management of heart failure - the No1 cause of death in this century today. At least 45000 of those people could be saved by a heart transplant, but we can transplant only about 2000 because of the shortage of donor agents" (website). As we have said already this is one main driver of Xenotransplantation – the desire to save lives. But the question is, is xenotransplantation an ethically acceptable means of achieving those ends? Should the Machiavellian principle of the end justifies the means be made the order of the day in biomedical technologies? Many answers have been given to these questions as shall be seen in the book. However, my thinking is that, the means is as important as

the end, none could be sacrificed for the other. This implies that caution must be applied in the use of xenografting procedure.

Though, xenotransplantation has a lot of praiseworthy prospects for the health of humans, the problems that could accompany its advent would be catastrophic. Diseases such as AIDS, diabetes, Parkinson's disease, acute liver failure, spinal cord injury, psoriasis, muscular dystrophy, myocardial infarction and other health conditions have plagued mankind for ages and have defied all attempts at cure. The news that organs, tissues and cells got from animals would cure these diseases is indeed a cause for celebration. But the question is, is it a worthy celebration? Though, the emergence of xenotransplantation offers great hope to the human race, it nevertheless is surrounded with evil, which I believe is capable of drowning what little hope it has for us. Xenotransplantation carries in itself the potential to sink the world. It could introduce a new world plague. It is capable of destroying basic religious beliefs and values. It could destabilize the ecosystem and thereby, increasing the environmental problems that are already proving too much to manage. The animals' existence would be threatened by xenotransplantation, thereby leading to a drastic reduction of the world's biodiversity – a biodiversity that is already speedily being lost.

Xenotransplantation is not yet a clinical success because, of the problem of immune rejection. However, in the nearest future it might become a huge

success like other forms of genetic engineering. When this time comes, efforts would be diverted from the present drive to create a sustainable environment to xenografting. Most of the problems xenografting is out to solve are problems that have their roots in environmental degradation. If the solutions to these problems are found in xenotransplantation, then, there is likely to be a drop in the motivation to take care of the environment. The motivation to take care of the environment, has hinged on the knowledge that environmental degradation affects human health negatively. But if xenotransplantation clears off this source of motivation, then the environment may totally degrade.

Other problems that could accompany xenotransplantation include:

- (1) The risk of introducing new infectious diseases to humanity.
- (2) It could reduce the dignity of humans
- (3) It could lead to identity crises
- (4) It questions God's existence and His creative role.
- (5) It could lead to abuse of human rights
- (6) It could contribute to overpopulation

These and many other challenges facing xenografting are x-rayed in this book. The main aim of this book is to conduct a philosophical appraisal of the implications of xenotransplantation to humans and the environment at large. And in attempt to doing this the work focuses on the following:

- (1) Showing the motivation behind xenotransplantation
- (2) Showing that the apparent potential benefits of xenotransplantation could become insignificant when compared with its potential danger to humans.
- (3) Showing that success in xenotransplantation could dissolve the current resolve to sustain the environment.
- (4) Showing the ethical, religious, psychological, epistemological, legal and health dilemmas surrounding xenografting.
- (5) Pointing to a better way at tackling human problems that would not destabilize the ecosystem.

It is hoped that the recommendations in the book would serve as sufficient reasons, for the government to regulate the activities of scientists as regards xenografting research.

At present xenotransplantation could arguably be said not to be a risk, which would imply that this research is not justified. However, it is good to note, that research efforts are seriously ongoing, implying that in the nearest future, there would be a breakthrough in xenotransplantation and it would become a clinical success. Better immunosuppressive drugs are being sought for and research is also making significant progress in genetic engineering of pigs (the most favoured animals for xenotransplantation), so as their organs would not suffer hyperacute rejection when used in humans. The possibility that researches would yield result necessitates this research. I believe that it is better to nip a problem at the bud

than to combat it when it is already full blown. Now that xenotransplantation is not yet fully developed and its catastrophic effects are not yet evident, it is better to tackle it, so as to save mankind and the world at large from imminent danger. Prevention is always better than cure.

This work gives support to the already done research on the ethical implication of xenografting and also challenges the committee of philosophers and scientists to join in the cost-benefit analysis of xenotransplantation. It is not good to endanger our future, that of the animals and other beings just for temporary gains that xenotransplantation holds for us. The end should not be made to justify the means – both are important. The means and the end must be held in complementary relationship as Asouzu would advise – the means and the end forms one complementary horizon and none is absolute (*Complementary Reflection* 156).

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2. History, types and source animals for xenografting

History of Xenotransplantation

Xenografting is a transplant procedure in which a human patient receives an organ (like kidney or liver) or living cells (such as brain cells) that come from a healthy animal instead of from a human donor. It is also used to refer to transplant between any two different species of animals. It is contrasted with allotransplantation, which is the procedure whereby cells, tissues and organs are transferred from members of the same species; like in transplantation of organs from one human to another. While allotransplantation is transplantation from the same species, xenotransplantation is transplantation across different species.

The living animal material that is transplanted into humans in xenotransplantation is called xenotransplant or xenograft.

Alexis Carrel is generally known as the founding father of experimental organ transplantation, because of his ground breaking work with vascular technique. Carrel and colleague Guthrie contributed tremendously to the science of transplantation. They performed autogenous vein grafts, performed leg replantation in dogs, and developed the famous patch-graft technique for widening narrowed vessels. They also performed heterotopic experimental transplantation; for instance, parts of a smaller dog were transplanted into the neck of a larger dog (Samdani <http://emedicine.medscape.com/article/432418-o>).