



GLOBAL JOURNAL OF HUMAN-SOCIAL SCIENCE: A
ARTS & HUMANITIES - PSYCHOLOGY
Volume 20 Issue 7 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-460x & Print ISSN: 0975-587X

A Christian View of Genetic Engineering

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GJHSS-A Classification: *FOR Code: 270805, 220315*



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A Christian View of Genetic Engineering

Etiemana Warri Benjamin ^α & Olumuyiwa Olusesan Familusi ^ο

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Keywords: christianity, human person, plant and animal, science, DNA.

I. INTRODUCTION

In an article originally published in the 1990s, Joseph Coates et.al (2008) had predicted that genetics will be a key enabling technology of the twenty-first century, rivaling information technology, materials technology and energy technology in importance. Isaac Asimov added that the advance of genetic engineering makes it quite conceivable that we will begin to design our own evolutionary progress (Asimov, 1977). Accordingly, the effects of all of these enabling technologies will be far-reaching across business and society. Breakthroughs in genetics in particular will be fundamental to many science and technology areas and societal functions, including health and medicine, food and agriculture, nanotechnology and manufacturing. Despite all the controversy surrounding it, genetic engineering is here

to stay and progress as biomedical engineering technologies become smarter and more sophisticated.

To a convincing extent, we can agree with Coates and others that genetic engineering has become a fundamental technology of the 21st century and there is more to expect from it in future. Nevertheless, from a holistic and pragmatic analysis, there is need to raise religious and moral concerns arising from genetic engineering and issues associated with this technological advancement. It could be said that there is no technology without accompanying challenges provoking moral questions and necessitating ethical considerations. Every novel breakthrough in science requires cross-disciplinary debate and discussion lest man becomes a victim of his own creations.

II. THEORETICAL CONTEXT

Expectedly, past and recent discussions on the relationship between religion and science have been both contentious and inherently distorted. Many have portrayed religion and science as independent, incompatible, and therefore unable to and should not collaborate (Drapper, 1874). Many others have dwelt on the supremacy of one over the other; trying to pitch religion over science and vice versa. Barbour identifies a four-fold model for the study of the interaction between Religion and Science. These include: Conflict, Independence, Dialogue and Integration (Ilan, 2000). For Artigas, the models are those of Convergence, conflict, complementarity and refusal of the articulation (2001).

Barbour's Dialogue model and Artigas' Complementarity Approach both affirm that rather than try to pitch science and religion against each other or present them as separate and mutually exclusive realms of human thoughts, both can enter into an intellectual dialogue and complement each other. John Paul II affirmed that science can purify religion from errors and superstitions; religion can purify science from idolatry and false absolutes. Each can draw the other into a wider world, a world in which both can flourish" (1988).

While Dialogue or Complementarity approach may not be a perfect model, it can promote a healthy relationship between science and religion; as observed by Alister McGrath (2010):

- Neither discipline can give a complete account of reality, regardless of the claims of several representatives on either side; when both voices are heard, a better understanding can be obtained.
- Both disciplines are concerned with explaining the world, although science can be said to focus on the

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how (the mechanisms) while religion addresses the why (a search for meaning), thus, complementing each other.

- Science not only successfully answers most of its own questions, but it also raises other question which is not equipped to answer without stepping over its own so-jealously-guarded limits.

All three reasons stated above revolve around the issue of incompleteness of and the need for complementarity. This therefore serves as a framework for religio-scientific discourse on genetic engineering.

Ming Zheng (2003) confirms that the characteristics of genetic engineering possess both vast promise and potential threat to human kind. Owing to its potential to give humanity unprecedented power over life itself, the research and application of genetic engineering has generated much debate and controversy. As this technology unleashes its power to impact our daily life, it will also bring challenges to our ethical system and core religious beliefs.

III. GENETIC ENGINEERING: A SCIENTIFIC ANALYSIS

Encyclopedia Britannica defines genetic engineering as 'the artificial manipulation, modification, and recombination of DNA or other nucleic acid molecules in order to modify an organism or population of organisms' (Last Updated: Jan 31, 2019). Coates et.al gives what we may call a functional definition of genetic engineering to mean 'the alteration of an organism's hereditary material, commonly used to increase plant and animal food production, diagnose diseases, and improve medical treatment'(2008). Genetic Engineering therefore, embraces the deliberate adaptation of an organism's genetic or hereditary material to eliminate undesirable characteristics or to produce desirable new ones. The technology under consideration may be known also as, 'biotechnology,' 'bioengineering,' 'recombinant DNA technology', etc.

Historically, the term genetic engineering initially referred to various techniques used for the modification or manipulation of organisms through the processes of heredity and reproduction. It is argued that Mother Nature has been carrying out genetic manipulations all this time, since way long before the primate ancestors of humans were even introduced on Earth as distinct species. This argument is used to explain the phenomena of evolution, natural selection and selective breeding.

Scholars also date back genetic modification to ancient times, when humans influenced genetics by selectively breeding organisms (Ranchel et.al, 2019). When repeated over several generations, this process led to dramatic changes in the species. Accordingly, dogs were likely the first animals to be purposefully genetically modified, with the beginnings of that effort

dating back about 32,000 years. People started breeding dogs with different desired personality and physical traits, eventually leading to the wide variety of dogs we see today. Rangel (2019) affirms also that the earliest known genetically modified plant is wheat. The continued selective breeding of wheat resulted in the thousands of varieties that are grown today. Thus we can settle that modern bio-technology has made it easier and faster to target a specific gene for more-precise alteration of the organism through genetic engineering.

Genetic engineering embraces both artificial selection and all the interventions of biomedical techniques, among them are: artificial insemination, in vitro fertilization (e.g. "test-tube" babies), cloning and gene manipulation. In the latter part of the 20th century however, the term came to refer more specifically to methods of recombinant DNA technology or gene cloning, in which DNA molecules from two or more sources are combined either within cells or in vitro, and are then inserted into host organisms in which they are able to propagate (Encyclopædia Britannica, Last Updated: Jan 31, 2019).

Genetic engineering in this work covers three main categories:

1. *Genetic engineering of humans:* Medical procedures which can save and prolong human life, enhance the quality of human life, or otherwise modify human features.
2. *Genetic engineering of animals:* Procedures which can modify the characteristics of animals to allow greater productivity, improved nutrient content, increased disease resistance, and enhanced aesthetic qualities.
3. *Genetic engineering of plants:* Procedures which can modify the characteristics of plants to allow greater productivity, improved nutrient content, increased resistance to diseases, pests or pesticides, and enhanced aesthetic qualities.

a) Types

Broadly speaking, three types of gene therapy exist. They are: Germ-line therapy, Enhancement gene therapy and Somatic gene therapy. Somatic cell engineering¹ and germ-line engineering² are, at present, the most significant types of genetic engineering in humans and both are used in gene therapy for

¹ By way of explaining, somatic cell engineering changes fixes or replaces genes in just one person. The targeted cells are the only ones affected; the changes are not passed on to that person's offspring.

² Germline genetic modification is a form of genetic engineering which involves changing genes in eggs, sperm, or very early embryos. This type of engineering is inheritable, meaning that the modified genes would appear not only in any children that resulted from the procedure, but in all succeeding generations. Germline engineering is controversial because of its potential for human enhancement.

correcting defective genes and for preventing the transmission of hereditary defects or diseases from one generation to subsequent generations.

However, Ishani Shukla (n.d) identifies three types which can better be seen or classified as three levels of genetic engineering, namely:

Analytical Genetic Engineering: This is the research branch of genetic engineering in which virtual genetic models are created using computer software. Various computer programs are used to theoretically study the implications of various genetic engineering activities if they are to be carried out in practice.

Chemical Genetic Engineering: In practice, this is the grass root level of applied genetic engineering as it deals with separating, classifying and graphing genes to prepare them for applied genetic engineering activities and experiments. It includes genetic mapping, studying genetic interaction and genetic coding.

Applied Genetic Engineering: This type or level pertains to practical application of genetic engineering tools to manipulate the genes of living organisms for making genetic copies of them or to introduce certain different characteristics in them.

b) Applications

Genetically Modified Organisms (GMOs) are essentially plants and animals that have had their genetic material (DNA) altered in a way that does not occur naturally. Genetic Engineering (GE) has several medical, agricultural (including plant and animal food production) and industrial applications. It is projected that in future, GE would make serious contributions in information technology especially in the use of DNA to trace criminals.

Joseph Coates et.al identifies agricultural application of genetic engineering in production thus:

- * *Designer animals:* This is where genetic programs are used to enhance animals used for food production, recreation and even pets. Genetic engineering can be used to increase growth, shorten gestation and enhance nutritional value. So far, fish like salmon have been genetically engineered and modified for faster growth and more resistant to infection by a blood virus. Equally, transgenic animals, sharing the genes of two or more species, may be created to withstand rough environments.
- * *Pest control:* Genetically engineered plants are created to resist pests in some ways possible.
- * *Boosting plants:* Genetically modified plants are expected to give higher yields and be more resistant to disease, frost, drought, and stress. They will have higher protein, lower oil and more efficient photosynthesis rates than ever before. Natural processes such as ripening can also be enhanced and controlled.

c) Industrial Application of Genetic Engineering

Industrially, genetically altered bacteria can be used to decompose many forms of garbage and to break down petroleum products. Some bacteria eat toxic substances, such as gasoline or industrial chemicals that are common pollutants. These bacteria can be cloned to make legions of bacteria with the ability to clean up environmental contamination. This would be an efficient intervention in cleaning up oil wastes in Nigeria's Niger Delta region.

d) Genetics and Human Health

Health professionals can now detect, treat and prevent 4,000 or more genetic diseases that humans are vulnerable to. Somatic cell engineering and germ-line engineering are used in gene therapy for correcting defective genes and for preventing the transmission of hereditary defects or diseases from one generation to subsequent generations. Science has also made possible the production of genetically engineered drugs and vaccines against very specific diseases (Encarta, 2008).

e) Human Enhancement

Genetic engineering makes it possible to use human growth hormone for more than its original intent as a treatment for dwarfism. It is believed that genetics may also be used for mental enhancement. For instance, 'Parents deficient in math skills may literally shop for genes that predispose their bearer to mathematical excellence and have these genes inserted prenatally or postnatal into their children. Other parents may select traits such as artistic ability, musical talent, charm, honesty or athletic prowess for their children' (Coates et.al, 2008). It is that good! To a very large extent, science and technology appear to have possessed answers to our health questions. The hope of human enhancement and selective breeding however is not without its social horrors and moral concerns.

f) Genetic Engineering – Cloning

Apart from Gene splicing (direct altering of genetic material to form recombinant DNA), another technique in genetic engineering that produces recombinant DNA is known as cloning. Cloning creates a copy of living matter, such as a cell or organism. The copies produced through cloning have identical genetic makeup and are known as clones.

Scientists have combined genetic engineering with cloning to quickly and economically produce thousands of plants with preferred qualities. Cloning techniques have also been applied to animals. A quick example is the famous Dolly in 1996. One advantage of this practice is that animals with new traits, such as the ability to resist disease, can be cloned and it could as well help booster populations of endangered species by cloning members from existing populations. 'Someday', according to Ian Wilmut, 'scientists may

even resurrect extinct species by cloning cells from preserved specimens' (1998).

Reproductive cloning is a deliberate production of genetically identical individuals. Each newly produced individual is a clone of the original. Thus, cells from two clones have the same DNA and the same genes in their nuclei. In principle, infertile couples and other individuals who wish to have a child that is genetically identical with one of them, or with another nucleus donor might wish to produce children through human reproductive cloning. A parent who lost a child might clone another child that looks like the deceased just to help them bear the loss.

Nevertheless, some essential moral questions must be considered. If scientists can clone plants and animals for numerous beneficial purposes, can they clone humans? Even if they are unable to do this successfully at this experimental stage, should they be encouraged or ignored or completely discouraged from such scientific audacity?

g) *Genetic Engineering – Medical Transplantation*

Medical transplantation is the transfer of a living tissue or organ³ to an injured or ill person to restore health or reduce disability. The transfer could be from one part of the body to another (as in the case of skin transfer) or from a living donor to an injured or ill person. The first successful transplant in 1954 served as a breakthrough for greater strides in medical transplantation. Today, many different organs and tissues can now be successfully transplanted into patients who can then expect to survive for years or even decades.

Most transplanted organs are from people who have died recently, particularly people involved in accidents injuring the head. Once all brain activity stops in a patient, the person is considered legally dead (Maugh II et.al, 2008). His organs can be harvested and given to the living. But consent must be sought and obtained from relevant parties. Living donors can provide other organs, including a kidney or a portion of their liver. But as demand for organs from living donors grew and eventually exceeded the supply, this gave way to efforts to use wholly or partially artificial organs made of plastic, metal and other synthetic materials.

Another technique that holds promise for medical transplants is the ability to regenerate tissues or organs in the laboratory from a patient's own cells and then transplant the laboratory-grown organ into the patient. Because the regenerated organ consists of the patient's own cells, the patient's immune system does not recognize the transplanted organ as foreign and so does not reject the new organ. The first laboratory grown organ to be transplanted was a bladder (Maugh II et.al,

2008). With less success rate, some surgeons considered using animals as donors. This is known as Xenotransplantation.

h) *Xenotransplantation*

Xenogeneic materials have the potentials to constitute alternative material of human origin and bridge the shortfall in human material for transplantation. Efforts to use chimpanzee's kidneys and Baboon's hearts for human beings were successful but patients did not live long. In these two cases, it was discovered that their sizes were too small for human beings. Pigs have organs that are the right size for human use, they have large litters, and they mature quickly so there is a ready supply of donating animals.

It is common knowledge that the immune system attacks transplanted tissues that have different antigens from those found in the rest of the body. To avoid organ rejection by the immune system of the patients, physician invented drugs to suppress the immune system. Some drugs suppressed the entire immune system and left the recipient vulnerable to a host of infections. But Cyclosporine for instance suppresses the part of the immune system involved in organ rejection with less severe impact on other parts of the immune system (Maugh II et.al, 2008). Scientists have used genetic engineering techniques to breed pigs whose blood vessels contain the marker antigens found in human blood vessels. This will ease compatibility when transplanted into human.

However, xenogeneic transplantation carries its own risks and obvious moral implications. We risk transmission of known or as yet unrecognized xenogeneic infectious agents from animals to human beings and from recipients of xenogeneic transplants to their contacts and the public at large. Maugh II et.al, (2008), reports that in 1997, scientists showed that pig viruses could infect humans with unpredictable results. This seriously calls for caution.

i) *General Criticisms*

Several works have been done on genetic engineering with major focus on its importance ranging from increasing plant and animal food production, diagnosing disease condition, medical treatment, improvement, as well as production of vaccines and other useful drugs. Introduced in 1996, the genetic engineering of plants and animals today looms as one of the greatest achievements of the 21st Century. With promises of making more and supposedly "better" food, this new technology - also known as Genetically Modified Organisms (GMOs) has received widespread acceptance and application. In the United States alone, it is reported that more than 154 million acres of GMO crops were planted in 2008, up from 143 million acres in 2007 (Fernandez-Cornejo et.al., 2014). GMO crops

³ Organs often transplanted are kidney, heart, lung, liver, intestines.

grown in the U.S. are corn, cotton, canola and soybeans, etc.

Soybeans and cotton that are genetically engineered with herbicide-tolerant traits have been the most widely and rapidly adopted genetically engineered crops in the U.S, followed by insect-resistant cotton and corn (Fernandez-Cornejo et.al., 2014). According to *Down To Earth Organic Website and Natural* (2019), through genetic manipulation, bioengineers have engineered potatoes with bacteria genes, "super" pigs with human growth genes, fish with cattle growth genes and thousands of other plants, animals and insects.

Where there are no laws mandating that these crops or animals must be labeled as genetically modified, vegetarians and meat-eaters are most likely unconsciously consuming genetically modified ingredients, whether they want to or not. Some risks of Genetic Engineering as identified by Charles Hagedorn (2000), Professor and Biotechnology Specialist are as follows:

- Potential harms to health which include:
- New allergens in the food supply
- Antibiotic resistance
- Production of new toxins
- Concentration of toxic metals - some of the new genes being added to crops can remove heavy metals like mercury from the soil and concentrate them in the plant tissue
- Enhancement of the environment for toxic fungi
- Unknown harms to health

Potential environmental harms which are not limited to but include the following:

- Cross contamination
- Increased weediness
- Gene transfer to wild or weedy relatives
- Change in herbicide use patterns
- Squandering of valuable pest susceptibility genes
- Poisoned wildlife
- Creation of new or worse viruses

New organisms created by genetic engineering could present an ecological problem. One cannot predict the changes that a genetically engineered species would make on the environment. An accident in engineering the genetics of a virus or bacteria for example could result in a stronger type, which could cause a serious epidemic when released. This could be fatal in human genetic engineering creating problems ranging from minor medical problems to death (Mercer et.al, 1999).

j) For Animals

Proponents of the technology assert that transgenic animals (animals that have been genetically altered through the introduction of another plant's or animal's genes), may one day help solve many of our modern day problems in life, from starvation and ill

health⁴, to environmental degradation and the modern extinction crisis. With regard to the agricultural industry, transgenic farm animals can be created, that are better able to resist disease, grow faster, and more efficiently reproduce than current species of animals. Various other diseases, from hypertension to AIDS, Down's syndrome, Alzheimers' disease, high cholesterol, anemia and hepatitis B, are likewise being studied through the use of genetically engineered animal models (Walter, 1998). Transgenic animals have made research of such diseases more accurate, less expensive and faster.

Animal rights groups have argued that the production of transgenic animals is harmful to other animals (Encarta, 2008). It threatens and weakens the genetic diversity of the herd and thereby makes them more susceptible to new strains of infectious disease. A particular disease or virus may wipe off the whole herd sharing the same genetic characteristics. Others argue that transgenic farm animals are far more likely to endure greater suffering than what is already experienced on factory farms.

When human growth hormone was implanted into a pig, the unfortunate result was pigs that ended up with bowlegs, cross-eyes, arthritis, and dysfunctional immune systems that made them susceptible to pneumonia. Likewise, dairy cows which are commonly injected with bovine growth hormone to increase their rate of milk production, are much more likely to suffer from udder disease (Comstock, 1992), and it also makes cows more susceptible to infertility and lameness. The basic is to respect species integrity, the idea that every animal, whether owned by humans or not, has a natural right to have its genetic code left intact and untouched.

k) Humans

Today, genetic engineering is used in fighting problems such as cystic fibrosis, diabetes, and several other diseases. Another deadly disease now being treated with genetic engineering is the "bubble boy" disease (Severe Combined Immunodeficiency). This is a clear indication that genetic engineering has the potential to improve the quality of life and allow for longer life span and even transmit quality to successive generations. With germline engineering mentioned earlier, scientists would assist parents decide their children's capabilities, eye colours, heights or even genders before birth. But there is a concern that

⁴ It is alleged that transgenic animals, like goats, sheep, and cattle engineered to produce large amounts of complex human proteins in their milk is very useful in the creation of therapeutic drugs. By engineering these animals to release these and other proteins in their milk, the mass production of high quality therapeutic drugs is made less costly, easier to manufacture, and at the expense of fewer animal lives than what was formerly the case. Moreover, scientists could clone a large number of animals that suffer from a human disease, such as arthritis, to study the disease's progression and potential treatments

pregnant women eating genetically modified products may endanger their offspring by harming normal fetal development and altering gene expression.

Apart from the use of embryos and the health effects from transgenic agricultural products, another frightening scenario is the destructive use of genetic engineering by terrorist groups or armies. A biological weapon that is resistant to medicines, or even targeted at people who carry certain genes would wreck colossal havoc on mankind. Genetically engineered organisms used for biological weapons might also reproduce faster, which would create larger quantities in shorter periods of time, increasing the level of devastation (Saylor, 2000).

IV. A CHRISTIAN RESPONSE

There is a fresh perception that religion 'remains an influential force in human society, despite the secularization brought about by scientific progress, bureaucratic rationalization, and economic growth' (Bainbridge, 2003). Religion still acts as a sure ethical guide to the use of scientific knowledge. Thus, religion is among the most powerful factors shaping attitudes toward gene manipulation. This is because science itself does not have the mechanism to determine what is moral, nor should we expect value judgment from her. Soon after the cloning of the first human embryos, there has been widespread condemnation from several Christian quarters. Theologians view some aspects of genetic engineering like cloning as a thorny issue, an example of the ongoing tension between faith and science. While some have advocated for a total ban on human cloning, others appreciate the development as an extension of God's blessing upon humanity.

Apart from arguments based on known and yet unknown risks of genetic engineering, *playing God* has become the strongest argument against genetic engineering. But in what sense is man playing God? Is there anything *Christianly* wrong in the genetic insertion of human genes into tomatoes and peppers to make them grow faster, or in eating pork with human genes? What would Jesus have said about rats genetically engineered to produce human sperm?

According to Ray Bohlin (2000), for some Christians, however, the notion of playing God carries a pietistic view of God's realm of activity versus that of the human race. In this context, playing God means performing tasks that are reserved for God and God alone. If this is what genetic technology does, then the concerns about playing God are justified. But what if God's intention was to transmit his creative sparks into man in order that man might become co-creators with the divine? If this is accepted, at what point can we say man has voyaged beyond his borderline into the realm of the divine? If concerns about 'playing God' are legitimate, are they meant to protect man from self-

destruction or a sympathetic crusade to prevent human usurpation of God's glory?

But as cited in Epstein (1998),

Why is it any more plausible to imagine God erecting electric fences around certain areas of knowledge than to imagine God watching with delight and parental pride as human beings use their divinely designed brains to decipher the code of life? What's wrong with envisioning god perching on the side of a Petri dish, eager to have us correct some copyists' errors which have crept into the three billion words in the past 600 million years?

However we choose to answer these questions, the Christian believer strongly believes that the while there may not be a '*no trespassing*' sign to limit man's voracious creativity, man must work within the ambits of his limited knowledge, rather than meddle into issues he is yet to fully grasp. It is therefore likely that this 'playing God' thing is more of saving man from his arrogance rather than saving God from losing his reserved-creator-status.

a) *Humans and Nonhuman Organism Sharing Genes*

The intercourse between human genes and nonhuman organisms seem to be taken too far even when there may be beneficial outcomes. Obsession with breakthroughs in gene manipulation could lead to a blurred relationship between animals and human beings. With the same genetic makeup, humans now have a deeper relationship with animals on the basis of shared genes. For if pigs are genetically engineered to produce human sperm, very weird experiments with humans may be suggested. Every scientific attempt that downgrades the image of God in man to the level of brute beast is an aberration. For man is more than just a being with blood and tissues, but a soul as well.

It is difficult to conclude that eating meat that are genetically modified or that carry human genes is a form of cannibalism, for it is possible to argue that the humanness of man is more than the genes. Bohlin argues that since one gene does not completely define a species. Therefore, transferring one gene from one organism to another does not create a hybrid in the traditional sense. What is different is that with genetic engineering, we have added something to a cell or organism that will change the composition of that cell or organism, possibly for as long as it lives, and is potentially passed on to future generations. What percentage of human genes does an organism have to contain before it is considered human?

But this presumptuous bravery may have very serious self-destructive outcomes that science cannot predict today. Thus, religious people on the basis of value of human life argue against unnecessary genetic intercourse with lower animals and plants. As more human genes are being used in non-human organisms

to create new forms of life that are genetically partly human, new ethical questions arise. It is either we are trying to raise animal and plant lives to the level of man or we are lowering ours to the level of non-human species. For every abuse of God's gift, there are grave repercussions. Doubtless, there is a risk to manipulating plants and animals because we are entering into territory that is still, for the most part, experimental.

b) *Gene Therapy and Gene Enhancement*

There is need to distinguish between genetic engineering as therapy and genetic engineering as enhancement procedure. Many human diseases, such as cystic fibrosis, Downs syndrome, fragile X syndrome, Huntington's disease, muscular dystrophy, sickle-cell anemia, Tay-Sachs disease, etc are inherited. They can be treated with genetic engineering. Broadly speaking, three types of gene therapy exist for treatment of genetic diseases namely: germ line therapy, enhancement gene therapy and somatic gene therapy. Whereas Somatic gene therapy is intended to introduce functional gene(s) to body cells, which enable the body to perform normal functions thus providing temporary correction for genetic abnormalities (Zheng, 2003), the germ line therapy involves the introduction of novel genes into germ cells such as egg or early embryo so that it would be passed on to future generations. The enhancement gene therapy is designed to literally enhance human potential by augmenting or introducing some desired traits and deleting undesirable ones. The end product is a super human or designer's human.

Somatic and germline enhancement or treatments are technically genetic engineering, but they have different intent and very different outcomes. Somatic gene therapy seeks to cure disease. Part of the Christian mission has always been to alleviate suffering where possible. The healing ministry of Jesus was not a show of power but to alleviate numerous kinds of human suffering, and genetic engineering has the potential to relieve the suffering from, if not even cure, genetic diseases (Bohlin, 2000).

In Catholic Church's *Donum Vitae* (1987), it is clearly stated that:

A strictly therapeutic intervention whose explicit objective is the healing of various maladies such as those stemming from chromosomal defects will, in principle, be considered desirable, provided it is directed to the true promotion of the personal well-being of the individual without doing harm to his integrity or worsening his conditions of life. Such an intervention would indeed fall within the logic of the Christian moral tradition.

Genetic enhancement and human cloning seek to change the very nature of man; to make him "super-human"; man designed according to the engineer's specification or fancy of a few rich individuals. This is the

real act of 'playing God'. Thus, the deliberate germline genetic engineering in humans where the DNA changes will be inherited by successive generations is by far the biggest and most profound risk in genetic engineering. Once humans begin cloning and genetically engineering their children for desired traits we would have crossed a threshold of no return. Imagine a world, a future where components like health, appearance, personality, cognitive ability, sensory capacity and life span of our children all become artifacts of genetic modification. This is exactly what the Church is referring to as manipulating the the human genetic patrimony.

Again the *Donum Vitae* (1987), cited in Taylor (2012) explains:

On the other hand, interventions which are not directly curative, the purpose of which is 'the production of human beings selected according to sex or other predetermined qualities,' which change the genotype of the individual and of the human species, 'are contrary to the personal dignity of the human being, to his integrity and to his identity. Therefore they can be in no way justified on the pretext that they will produce some beneficial results for humanity in the future,' 'no social or scientific usefulness and no ideological purpose could ever justify an intervention on the human genome unless it be therapeutic, that is, its finality must be the natural development of the human being.

c) *The Burden of Artificial Dichotomy*

The expensive nature of germline and enhancement therapy needs to be considered from a religious angle too. There is no assurance that this therapy could be available to all. A molecular biologist Lee Silver of Princeton University confirms that the costs of these technologies will limit their widespread adoption, so that over time, society will segregate into the 'GenRich' and the 'Naturals.' In Silver's vision of future America, he writes:

The GenRich - who account for 10 percent of the American population - all carry synthetic genes. All aspects of the economy, the media, the entertainment industry, and the knowledge industry are controlled by members of the GenRich class....Naturals work as low-paid service providers or as laborers.... [Eventually] the GenRich class and the Natural class will become entirely separate species with no ability to cross-breed, and with as much romantic interest in each other as a current human would have for a chimpanzee (1997).

The Jesus who bridged the gap between the poor and the rich would certainly see this dichotomy as a disturbing contradiction and insult to the Maker. This artificial caste system would in principle and practice contradict principles of fairness, justice and human equality.

d) *The Burden of Embryo Destruction*

Religious people are divided over the status of the embryo. At what point should an embryo be considered human and deserving of the *dignitatem persona*? Some Christians believe that the principle of the sanctity of life covers all human life from the embryo stage. We have Christians who think that an embryo before fourteen (14) days does not have full human status thus embryos at this stage can be used in procedures aimed at resolving serious genetic conditions or diseases. Life begins at conception and there is no justification to use embryos even if the research leads to medical breakthroughs.

In this religious parlance, research cloning, where embryos are destroyed is unethical. In experiments to create the first cloned rabbits in 2001, scientists implanted (371) embryos into surrogate mothers, but only six cloned rabbits were born (Ian, 1998). It is possible that in IVF and other cloning procedures, human embryos are cloned and destroyed at the end of experimentation, such as the ones used to harvest stem cells. The Roman Catholic Church in *Dignitas Personae* teaches that, 'to create embryos with the intention of destroying them, even with the intention of helping the sick, is completely incompatible with human dignity'.

Again, what happens to embryos with very serious genetic disorders caused by chromosomal abnormalities? Prenatal diagnosis can detect the defect in a fetus with great precision. The question then becomes, should the foetus be aborted if the screening result is positive? Is this one instance that the lesser of two evils should be chosen?

e) *The Burden of Medical Transplantation*

The positions taken by the various religious organizations range from those that strongly support and view organ donation as "an act of charity, fraternal love, and self-sacrifice, to those that are strictly against such donations". The chief emphasis seems to be the consent of individual donor or family. Amongst Christians, The Amish consent to donation if they know it is for the health and welfare of the transplant recipient; the Catholics hold that organ and tissue donation is considered an act of charity and love, and transplants are morally and ethically acceptable to the Vatican; The 70th General Convention of the Episcopal Church recommends and urges "all members of this Church to consider seriously the opportunity to donate organs after death that others may live; Jehovah's Witnesses are often assumed to be opposed to organ donation because of their belief against blood transfusion. However, *Finger Lakes Donor Recovery Network* (n.d) remarks that this merely means that all blood must be removed from the organs and tissues before being

transplanted. The list could go on to include the position of other religions like Islam⁵, Judaism, Buddhism, etc.

Those who oppose medical transplantation do so on the basis of some misunderstood Christian teachings. They believe our bodies as God's temple ought not to be desecrated in transplants. And the body has to be preserved for reunion with God at resurrection. One may ask, does organ transplants actually defile the temple of God and denies one access to heaven? Organ transplants do not defile the Temple of God, as the resurrection body in Pauline thought is an immortal body (cf. 1 Corinthians 15:35-49). It therefore means that the believer would not be denied access into heaven because he has one kidney.

However, the acceptance of medical transplantation seems to be on human organs alone, not from lower animals. Religious people still trust the efficacy of prayer in the age of science. In an event where there is no divine healing and a human organ is difficult to procure, should Christians not accept organs from pigs, baboons and chimpanzees? The real question should be, to what extent should we go to save our lost ones? Organ donation and transplant while ethically permissible cannot be afforded by everyone and those who can afford need not go to an extraordinary length to preserve life. For it is known that some patients may require transplants more than twice. The Bible does not prohibit prolonging life through the medical procedures of organ transplantation. But we should thus prevent unnecessarily prolonging life. Who and what determines how long and how well a person may live after organ transplant? The need to save this physical life must not be allowed to erode the eternal value of life after death which is part of the religious belief system. St. Paul says, 'For me to live is Christ and to die is gain' (Philippians 1:21).

The theology of sanctity of life suggests the permissibility of transplants to maintain life. Transplanting should then be carried out in a way that maintains the dignity of donors and the recipients. To clone human beings with same genetic makeup in order to provide compatible spare parts for its owner or twin (saviour sibling concept) is grossly monstrous and insulting to the dignity of the human person and the image of God in man.

Therefore, 'when retrieving organs, one must use honorable means. Any action manipulating a person's situation for another's personal gain violates the spirit of the eighth commandment and should be strictly avoided' (Rooker, 2010; Graham, 2014). An example of such behaviour is taking advantage of one

⁵ The Qur'an accepts removal of organs only as a way of treating the ailment; the success of the transplantation must be highly probable; the donor or the family must have consented to it; and if possible transplantation must be between Muslims only. Cf. Slabbert, M., Mnyongani, F. and Goolam, N. 2011. Law, religion and organ transplants. *Koers*76: 261-82.

dying or poor person to harvest organs for another person in need of a transplant. This gives the rich unfair advantage to procure as many as they would need. Any organ procurement taking place against or irrespective to the donor's wishes violates his dignity. Apart from being an act of love, our role as stewards applies to organ transplants because organs are a resource. It is commendable if organs are used to give life back to the dying rather than left to rot in a grave.

What about cadaveric transplantation? The current standard for cadaveric transplantation is retrieval from heart beating donors. A heart beating donor is brain dead with circulation artificially maintained by a ventilator (Erica, 2014). It is permissible to harvest organs from newly-dead people upon the consent of the family of the deceased. Respect for cadavers is still required because respect for the body is irrevocably tied to respect for the life of the entire person. The sanctity of life is an immovable standard established by God in the sixth commandment (Exo.20:13). Maintaining sanctity of life in the process of cadaveric transplants consists of preventing premature declarations of death, ensuring adherence to a strict definition of death, ensuring a humane death and not unnecessarily prolonging life sustaining treatments.

While not defending the rights of animals whose organs are harvested with impunity, recorded cases of xenotransplantation reveals most patients do not live long. Animal organs are not compatible with human organs leading to underperformance and rejection by the patient's defense system. To force the body to accept foreign organs, doctors administer immunosuppressive drugs which turn out to put patients at greater risks for sickness and tumors in the future. Again, there are cases of infections. It appears what is achieved is less than what is spent on medical transplantation. Improper and ungodly motives and attitudes, allowing a living person to donate vital organs resulting in virtual suicide, and the marketing and improper allocation of the organs and tissues (Bobby, 1998) is unjust.

V. RECOMMENDATIONS

- Christian scholars, theologians and legislators must not sit complacently as this technology rapidly changes the moral fabric of our existence from the inside out. This calls for the formation of educated opinions and inspiring legislative regulation. They must not wait and see what the effects would be before reacting to them.
- Christians should accept scientific progress provided it does not violate or diminish the sacred value of bodily life. Medical interests of procuring organs must never be allowed to negatively affect the respect, dignity, and care of a person.

- The exploration of God's created order for the good of humankind is one of the joy and privileges of being a scientist. However, Christians must accept that human knowledge tainted with sin can be very destructive. Christians will therefore be suspicious of arrogant or naively optimistic attitudes towards the exploitation of the natural world.
- Simply because society can pursue a particular medical, reproductive or genetic procedure does not mandate that it must. Especially in the area of genetics, "can" does not mandate "ought".
- Christian scholars in third world countries like Nigeria should keep in step with current scientific issue in order to delineate areas of collaboration with science and implications that threaten humanity in general and the abused classes in particular.
- What should be kept in mind, apart from the loss of human dignity is, to consistently ask if these therapies will finally exclude the disadvantaged and exacerbate already existing domestic and global socio-economic inequalities, especially in very corrupt nations like Nigeria.

VI. CONCLUSION

There is no doubt that genetic engineering, as with many other technologies, have great potential for misuse in the hands and minds of man. As Denis Alexander (1997) observes, 'Humanistic science has not been immune from arrogance in its Utopian ambitions', and this cannot be denied. Some sociologists had anticipated that secularization would eventually lead to the extinction of faith, except perhaps in cultural backwaters or among neurotics. But much empirical evidence about the enduring strength of religion weighs against this view. But religion has to prove itself as a relevant conserving force to reckon with today. There is no doubt that genetic engineering of plants and animals will continue well into the future. With the newfound breakthroughs in cloning, the capabilities of changing human characteristics are unpredictable. Man can then anticipate intense cross-disciplinary debate and discussion as new life forms are emanating through science and medicine. (Powledge, 2002).

The desire for man to play or be God and recreate man in his own mold is just the ultimate extension of man wanting to be like God in the Garden of Eden (cf. Gen.3:4-5) and at the Tower of Babel (cf. Gen.11:1-9). If human beings are not content with what they were created to be, they will suffer the consequences again. Christians persistently need to draw attention to this fact. Genetic engineering can make a significant contribution to the prevention and cure of human disease, and to the feeding of a hungry world. The contemporary trends that reduce our total nature solely to genetic information not as spiritual

beings as well is deeply sickening and *infra dignitatem persona*. The moral cost cannot be justified, no matter how noble the goal.

Bainbridge's conclusion on cloning has both hope and caution thus;

At some time in the future, cloning may be a relatively reliable human reproductive technology, and a well-accepted industry for producing biological products including human organs for transplantation. But at the present time, the technology is very poorly worked out, and methods that have been somewhat successful with other animals appear to be unsuited for human beings. Thus, it is quite reasonable to predict that human reproductive cloning will face a difficult period of technical development, in which the danger of deformed, short-lived, and suffering clones would be increased by impatience (2003).

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