ISSN 2229-5518

Philosophical appraisal of stem cell research: A Challenge to Scientific Researchers

Onuoha Jude .A.(Ph.D)
Department of Philosophy of Science & Technology
Federal University of Technology Owerri
Imo State

Abstract: The present day modern researches are faced with myriads of problems in their efforts to unravel the secrets of nature especially as relates to "human life". What is the meaning of life? How can we improve on life expectancy? Is there any possibility of recreating or manufacturing life? These thought-provoking questions are both topical and tropical issues in our present day society and they are also major concerns of present day researches especially in the area of stem cell. This work is out to access, appraise and evaluate philosophically the progress made by modern researches. It also x-rays the problems encountered and solutions fashioned to enhance the result of the findings made in stem cell research.

Keywords: Challenges, fertilization, human, embryos, modern, researchers, stem cell,

INTRODUCTION

Statistically speaking, every skin regenerates every seven days. A cut heals itself and disappears in a week or two. Every single cell in a skeleton is replaced every seven years. The future of medicine lies in understanding how the body works and creates itself out of a single cell and the mechanisms by which it renews itself through life[1]. Thus achieving this goal, will be able to replace damaged tissues and help the body regenerate itself, potentially curing or easing the suffering of those afflicted by disorders like heart disease, Alzheimer, Parkinson, spinal cord injury and cancer. Medical researchers and other scientists study stem cells to understand basic processes in cell development and diseases. These special properties of stem cells make them potentially powerful medical tools that could repair or replace diseased or injured tissues or organs in humans. Research is usually done with stem cells from mice or from humans.

WHAT ARE STEM CELLS?

[1] www.stemcell.standford.edu/research/

Stem Cell(s)

The term “Stem Cell” is according to the Merriam Web Dictionary, an undifferentiated cell that can give rise to other cells of the same type indefinitely or from which specialized cells such as blood cells develop. According to the 7th edition of Oxford Advanced Dictionary, a stem cell is the basic type of cell which can divide and develop into several other independent cells with a particular function.[2] Stem Cell, are a type of cells that can make any kind of cell required to build an organism. When a stem cell divides, one new cell that results can remain a stem cell while the other new cell becomes an ordinary cell with a particular function in the organism.
Stem cells have the remarkable potential to develop into many different cell types in the body during early life and growth. In addition, in many tissues they serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a muscle cell, a red blood cell, or a brain cell.

Stem cells are distinguished from other cell types by two important characteristics. First, they are unspecialized cells capable of renewing themselves through cell division, sometimes after long periods of inactivity. Second, under certain physiologic or experimental conditions, they can be induced to become tissue or organ with specific cells with special functions. In some organs, such as the gut and bone marrow, stem cells regularly divide to repair and replace worn out or damaged tissues. In other organs, however, such as the pancreas and the heart, stem cells only divide under special conditions.

Stem cells are important for living organisms for many reasons. In the 3 to 5 day old embryo called a blastocyst, the inner cells give rise to the entire body of the organism, including all of the many specialized cell types and organs such as the heart, lung, skin, sperm, eggs and other tissues. In some adult tissues, such as bone marrow, muscle, and brain, discrete populations of adult stem cells generate replacements for cells that are lost through normal wear and tear, injury, or disease.

[2] Oxford advance learner dictionary, 7th edition, Oxford University Press, New York, 2006

HISTORICAL MOVEMENT AND MEDICAL RESEARCH IN STEM CELL

In 1981 scientists first grew cultures of stem cells from mice embryos. Although that achievement marked the beginning of extensive research, growing human stem cells in a laboratory remained an elusive goal until 1998. That year two research teams independently announced that they had isolated and grown human stem cells. The teams were led by biologists John Gearhart at Johns Hopkins University and James Thomson at the University of Wisconsin at Madison.

During the late 1990s scientists discovered many characteristics of stem cells. Perhaps most interesting, various investigators showed that even mature stem cells from one tissue, the blood, for example can create cells of another tissue type, such as *neurons* (nerve cells) for the brain. In some of the most exciting results, researcher Fred Gage at the Salk Institute for Biological Studies showed that the brains of adult humans can create new neurons. Before Gage's discovery, neurobiologists assumed that our brain did not create any new cells after birth. Presumably, the capacity for ongoing creation of neurons comes from stem cells. In addition, Gage and his colleagues found that a mentally stimulating environment or even exercise can enhance the creation of neurons in the brain.

The medical profession used adult stem cells to treat diseases long before anyone isolated one. In 1968 scientists performed the first successful bone marrow transplant, a procedure in which a patient receives an infusion of healthy bone marrow cells. The purpose of such transplants is to restore the blood-making capabilities of the patient's diseased bone marrow after extremely strong chemotherapy has destroyed that bone marrow. From the beginning investigators suspected that stem cells in the infused bone marrow make this technique work. Bone marrow transplants are now a standard therapy for certain cancers, such as leukemia and lymphoma, and for other diseases of the blood and bone. Other stem cell therapies in current use involve blood stem cells isolated from drawn blood and taken from umbilical cords.

By the beginning of the 21st century researchers had not yet developed any medical treatment that relied on isolated stem cells grown in culture. Because of their ability to repair tissue damage, stem cells could serve as starting points in therapy for a wide variety of medical conditions, including Alzheimer's disease, which damages brain cells, especially those related to memory, and Parkinson disease, which damages nerves that control the muscles. Other diseases, such as diabetes, heart disease, and leukemia, might also be treated with stem cells to replace or repair damaged, diseased, or lost cells and tissues.

TYPES OF STEM CELL

Two basic types of stem cells can be found in humans and animals: embryonic stem cells and adult or somatic stem cells. Embryonic stem (ES) cells are stem cells derived from the inner cell mass of a blastocyst, an early stage embryo. Human embryos reach the blastocyst stage 3 to 6 days post fertilization, at which time they consist of 50–150 cells. Embryonic cells are pluripotent and give rise during development to all derivatives of the three primary germ layers: ectoderm, endoderm and mesoderm. In other words, they can develop into each of the more than 200 cell types of the adult body when given sufficient and necessary stimulation for a specific cell type. They do not contribute to the extra-embryonic membranes or the placenta[3].

Nearly all research to date has made use of mouse embryonic stem cells or human embryonic stem cells. Both have the essential stem cell characteristics, yet they require very different environments in order to maintain an undifferentiated state. Mouse embryonic stem cells are grown on a layer of gelatin as an extracellular matrix and require the presence of leukemia inhibitory factor. Human embryonic cells are grown on a feeder layer of mouse embryonic fibroblasts and require the presence of basic fibroblast growth factor. Without optimal culture conditions or genetic manipulation, embryonic stem cells will rapidly differentiate. A human embryonic stem cell is also defined by the expression of several transcription factors and cell surface proteins. The transcription factors Oct4, Nanog, and Sox2 form the core regulatory network that ensures the suppression of genes that lead to differentiation and the maintenance of pluripotency.

There are currently no approved treatments using embryonic stem cells. The first human trial was approved by the US Food and Drug Administration in January 2009. However, the human trial was not initiated until October 13, 2010 in Atlanta for spinal injury victims. On November 14, 2011 the company conducting the trial announced that it will discontinue further

[3] "Culture of Human Embryonic Stem Cells". National Institutes of Health. Retrieved 2010-03-07.

development of its stem cell programs.[4] ES cells, being pluripotent cells, require specific signals for correct differentiation if injected directly into another body, ES cells will differentiate into many different types of cells, causing a teratoma. Differentiating ES cells into usable cells while avoiding transplant rejection are just a few of the hurdles that embryonic stem cell researchers still face. Many nations currently have moratoria on either ES cell research or the production of new ES cell lines. Because of their combined abilities of unlimited expansion and pluripotency, embryonic stem cells remain a theoretically potential source for regenerative medicine and tissue replacement after injury or disease.

Embryonic stem cells have the potential to develop into any organ or type of tissue in the body. This property is called *pluripotency*. Embryonic stems cells exist in fully developing embryos for a limited period of time (about three to six days). However, embryonic stem cells produced in laboratory conditions continue to divide and can be sustained almost indefinitely in nutrient cultures.

Adult stem cells, also called somatic stem cells, are found in humans and animals after birth and remain active in the body throughout a lifetime. Adult stem cells can only turn into certain specialized types of cells. Different types of adult stem cells act as a repair system and are able to replace such cells as blood cells, bone cells, or certain nerve cells in the body. Researchers continue to discover new types of adult stem cells in different parts of the body and have discovered that blood stem cells originate in the placenta. In living humans and animals, development of adult stem cells appears to be influenced by their niche or microenvironment in the body, which restricts what they become. Some progress has been made in reprogramming adult stem cells in the laboratory to act more like embryonic stem cells and produce more types of cells. Cultures of adult stem cells have been difficult to sustain in laboratories, however.

Other types of stem cells are related to embryonic or adult stem cells but have different properties. Fetal stem cells are similar to embryonic stem cells and occur in a developing fetus. Umbilical or neonatal stem cells are found in the umbilical cord at birth and are similar to certain types of adult stem cells but less mature.

[4] Ron Winslow (2009). "First Embryonic Stem-Cell Trial Gets Approval from the FDA". The Wall Street Journal. 23. January 2009.

Cancer stem cells are found in some tumors and in some blood cancers (*see* leukemia), and appear to be a factor in making such cancers grow. Similar to normal adult stem cells, cancer stem cells can divide to produce a new cancer stem cell and a particular type of cancer cell.

MAJOR ACCESSIBLE SOURCES OF ADULT STEM CELLS IN HUMANS

There are three major accessible sources of autologous adult stem calls in human:

- Bone Marrow: Stem cells in the bone marrow require extraction by harvesting; that is, drilling into bones. Stem cells from bone marrows are also known as stromal cells.

- Adipose Tissues (Lipid Cells): These stem cells are found in some fatty tissues in the body and they are extracted through liposuction.

- Blood: Stem cells derived from the blood require extraction through a process called aphaeresis'. These stem cells are also called hematopoietic stem cells.

KINDS OF STEM CELLS ACCORDING TO POTENCY

Potency specifies the differentiation potentiality of the stem cell.

- Totipotent (also known as omnipotent): These stem cells can differentiate into embryonic and extra-embryonic cell types. Such cells construct a complete, viable organism. These cells are produced from the fusion of an egg and sperm cell. Cells produced by the first few divisions of the fertilized egg are totipotent.

- Pluripotent: these stem cells are the descendants of totipotent cells and can differentiate into nearly all cells. They are derived from any of the three germ layers of the blastocyst (embryo) 3- 6 days after fertilization.

- Multipotent: These stem cells can differentiate into a number of cell types, but only those of closely related family of cells.

- Oligpotent: These stem cells can differentiate to only a few cell types, such as lymphoid or myeloid stem cells.

- Unipotent: These cells can produce only one cell type which is their own; but they have the property of self-renewal which distinguishes them from non-stem cells.

STEM CELL THERAPY

Stem cell therapy is an intervention strategy that introduces new adult stem cells into damaged tissue in order to treat disease or injury. Many medical researchers believe that stem cell treatments have the potential to change the face of human disease and alleviate suffering. The ability of stem cells to self-renew and give rise to subsequent generations with variable degrees of differentiation capacities, offers significant potential for generation of tissues that can potentially replace diseased and damaged areas in the body, with minimal risk of rejection and side effects.

A number of stem cell therapies exist, but most are at experimental stages, costly or controversial, with the notable exception of bone-marrow transplantation. Medical researchers anticipate that adult and embryonic stem cells will soon be able to treat cancer, Type 1 diabetes mellitus, Parkinson's disease, Huntington's disease, Celiac disease, cardiac failure, muscle damage and neurological disorders, and many others. Nevertheless, before stem cell therapeutics can be applied in the clinical setting, more research is necessary to understand stem cell behavior upon transplantation as well as the mechanisms of stem cell interaction with the diseased/injured microenvironment.

CHARACTERISTICS OF STEM CELLS

SELF RENEWAL: this is the ability of the cell to go through numerous cycles of cell division while maintaining the undifferentiated state. Unlike muscle cells, blood cells or nerve cells which do not normally replicate themselves. Stem cells may replicate many times or proliferate.

SPECIALIZATION: Stem cells are also capable of differentiating into specialized cell types. When unspecialized stem cells give rise to specialized cells, the process is called differentiation.

MERITS OF STEM CELL

- It provides medical benefits in the fields of therapeutic cloning and regenerative medicine.
- It provides great potential for discovering treatments and cures to a plethora of diseases including Parkinson's disease, schizophrenia, Alzheimer's disease, cancer, spinal cord injuries, diabetes and many more.
- Limbs and organs could be grown in a laboratory from stem cells and then used in transplants or to help treat illnesses. If the stem cells are extracted from the patient's own body, they do not run the risk of organ rejection from the immune system.
- It will help scientists to learn about human growth and cell development.
- Scientists and doctors will be able to test millions of potential drugs and medicine, without the use of animals or human testers. This necessitates a process of simulating the effect the drug has on a specific population of cells. This would tell if the drug is useful or has any problems.
- Stem cell research also benefits the study of development stages that cannot be studied directly in a human embryo, which sometimes are linked with major clinical consequences such as birth defects, pregnancy-loss and infertility. A more comprehensive understanding of normal development will ultimately allow the prevention or treatment of abnormal human development.
- It has thrown light on cell development and growth of organs in humans.
- It has opened new doors in the field of clinical research as doctors can study the potential of new drugs without testing them on animals and humans.
- It has helped study all the different development stages in a human embryo, study the causes and treatments of birth defects, pregnancy loss and infertility. This can help get rid of fetal anomalies (diseases and abnormalities present during birth) and treat them at an early stage.

DEMERITS OF STEM CELL

- The use of embryonic stem cells for research involves the destruction of blastocysts formed from laboratory-fertilized human eggs. For those people who believe that life begins at conception, the blastocyst is a human life and to destroy it is immoral and unacceptable.
- Like any other new technology, it is also completely unknown what the long-term effects of such an interference with nature could materialize.
- Embryonic stem cells may not be the solution for all ailments.
- According to a new research, stem cell therapy was used on heart disease patients. It was found that it can make their coronary arteries narrower.
- A disadvantage of most adult stem cells is that they are pre-specialized, for instance, blood stem cells make only blood, and brain stem cells make only brain cells. These are derived from embryos that are not a patient's own and the patient's body may reject them.
- The use of embryonic stem cell has set religious groups and political parties into frenzy. This treatment involves destruction of blastocysts post extraction of stem cells. These blastocysts are derived from the excess embryos left after an IVF treatment. This sect of society believes that life begins immediately after conception and this sort of practice is nothing short of killing. It has stirred many debates where people think that this is an immoral and unacceptable practice.
- They don't have solutions for every ailment.
- The technology used is a little expensive, though governments of certain countries have special concession for children who have chances of developing certain diseases or are born with abnormalities.
- Fully grown stem are pre-specialized and have limited scope of differentiation for instance, blood stem cells can make only blood and not other organs like kidney and liver. Also, they are lesser in numbers and are not easy to cultivate.
- The stem cells derived from embryos stand chances of rejection as they are not patients own and stand chances of rejection.

ETHICAL IMPLICATION

Despite the promise of stem cells research, using human stem cells have stirred considerable ethical controversies. The controversy mainly surrounds the use of stem cells that come from human embryos. Important cells are extracted from the young embryo which may lead to harm or the eventual death of the embryo. Some of these ethical issues against the use of human embryonic stem cell research are:

- HUMAN EMBRYOS ARE HUMAN PERSONS

Human life begins at conception. Human embryos have the status of human person and therefore should be accorded the dignity and respect human person deserves.

- HUMAN NEVER TO BE TREATED AS MERE OBJECTS.

When a human being is used for scientific experimentation as if it were an object, then the human being is treated as means to an end. The scientific researchers justified their action by appealing to the greater good that can be accomplished through the use of human tissues, organ, etc. Man has dignity, which should not be neglected or trampled upon at anytime. Thus, Kant holds that man is never to be treated as means but always as an end in itself. The human person has intrinsic value and dignity and may not be used as mere means to some higher good or greater good of the society.

- IN VITRO FERTILISATION NOT ACCEPTABLE

The only possible means of obtaining the semen are by condomistic intercourse, coitus interruptus, and any other methods not connected with sexual intercourse. Thus, artificial insemination as a substitute for conjugal act is unethical because of the means used to obtain the semen for the insemination. In vitro fertilization is viewed as standing in opposition to the dignity of procreation and conjugal act union.

THE CHALLENGES OF MODERN RESEARCHERS ON STEM CELL

Embryonic stem cells are the basic building blocks for some 260 types of cells in the body and can become anything: heart, muscle, brain, skin, blood. Researchers hope that by guiding stem cells in the laboratory into specific cell types, they can be used to treat diabetes, Parkinson's disease, heart disease, or other disorders. The primary clinical source is the aborted fetus and unused embryos currently housed in frozen storage at IVF facilities. A developed stem cell line comes from a single embryo, becoming a colony of cells that reproduces indefinitely. Consider now the problems with Embryonic Stem Cell Research

THE ISSUE OF WHO OR WHAT

As the nation sits embroiled over the battle of where to draw the line on ESCR[5], the real issue that truly divides us is whether embryonic stems represent a who or a what. In other words, are we talking about people or property? Since Roe v. Wade we have not been willing or able as a nation to address the issue. As a result, those who oppose ESCR and those who support it will never reach an acceptable point of compromise. Still, in the midst of the flurry of all this biotechnology and all the problems it presents, there is some very good news that has been overlooked by almost everyone. Ready? Cloning proves scientifically that life begins at conception a position to which the author and most Christians philosophically already adhere.

Additionally, the insights provided by cloning technology destroy the scientific and legal basis of distinguishing a pre-embryo from an embryo, the popular distinction made at 14 days after conception. This is significant because this distinction determines the handling and treatment of human life less than 14 days old, which is so basic to all ESCR. In short, our understanding of embryonic development as provided by cloning technology could force not only those who participate in ESCR specifically, but also those who participate in in-vitro fertilization (IVF) procedures generally, to recognize there is no real pre-embryo distinction and that all human life begins at conception. Therefore, as a nation, we should rightly adjust the moral and legal treatment and status of all embryos to people not property from the point of conception.

THE DELIBERATE MISUSE OF TERMINOLOGY IN DEFINING STEM CELLS

Proponents of ESCR often use the term pluripotent. This word intends to imply that the ESC cannot make or reform the outer layer of the embryo called the trophoblast. The trophoblast is required for implantation of the embryo into the uterus. This is a distinction used by proponents of ESCR to imply a fully formed implantable embryo cannot and does not reform after the

[5] ESCR (Embryonic Stem Cell Research)

original embryo is sacrificed. This is significant because to isolate the stem cells, scientists peel away the trophoblast or skin of the embryo much like the peel of an orange. They then discharge the contents of the embryo into a petri dish.

At this stage of development, the stem cells that comprise almost the entire inner body of the early embryo look and function very similar to one another. Once put into the petri dish, the un-programmed cells can be manipulated to multiply and divide endlessly into specific cell types. The question regarding use of the term pluripotent is whether stem cells emptied into the petri dish can reform the trophoblast creating an implantable embryo of the originally sacrificed embryo? The uncomfortable truth is, James Thomson, who led the effort that first isolated and grew embryonic stem cells in the laboratory says the trophoblast can reform under certain circumstances. That means even after months of continuous proliferation of the cells, implantable cloned human beings of the original embryo might be forming as the stem cells are grown in Petri dishes. Therefore, use of the term pluripotent is scientifically inaccurate and deliberately misleading.

ESCR IS RELATED TO HUMAN CLONING

Understanding how ESCR and human cloning relate requires delineation between the two forms of human cloning: reproductive and therapeutic. Reproductive cloning creates a later born twin from a single cell of another person by transplanting the DNA of the adult cell into a human egg whose nucleus has been removed. This process is somatic cell nuclear transfer. In this procedure, the resulting embryo is implanted in a woman and carried to birth. Proponents say that reproductive cloning is a logical extension of infertility treatments, hence the intimate link to IVF procedures. By contrast, therapeutic cloning occurs when an adult undergoes a cloning procedure to duplicate his own cells in order to stave off personal disease, illness or the effects from sudden and serious injury. This procedure also begins by creating a clone of the adult through somatic cell transfer. In therapeutic cloning however, the embryos are allowed to live up to 14 days, at which time their trophoblasts are removed, as in standard ESCR, to harvest the highly prized stem cells for the donor's treatment. In summary, therapeutic cloning begins with the same procedure as reproductive cloning. The goal of reproductive cloning is to produce a baby. The goal of therapeutic cloning is to produce embryonic stem cells for research and or treatment. Additionally, whenever embryonic stem cell research results in the spontaneous reformation of the trophoblast around other stem cells, a fully implantable cloned life of the originally sacrificed embryo is created, however temporarily.

ESCR PUTS US ON THE ROAD TO GROWING HUMANS FOR BODY PARTS

The un-programmed cells of an early embryo are derailed from their natural course of development and coaxed through chemical manipulation to become very specific tissue types that will be used to treat the unhealthy or diseased tissue of those already born. Opponents of funding ESCR have argued vehemently against this stark utilitarian treatment of human life, unfortunately with little effect. Regarding the justification that the embryos "left over" in IVF clinics will simply be discarded anyway, reflects a chilling absence of moral conscience. We do not consider it appropriate to take organs from dying patients or prisoners on death row before they have died in order to increase someone else's chances for healing or cure. Neither, then, should we consider any embryos "spare" so that we may destroy them for their stem cells.

How far down this road have we already come? Consider the story of Adam and Molly Nash. Molly was diagnosed with Fanconi anemia a hereditary and always fatal disease. Doctors determined that the best hope for Molly was a cell transplant from a relative whose cells matched Molly's, but without anemia. So Molly's parents produced fifteen embryos by IVF, only one of which had the right genetic material. It was implanted in Mrs. Nash who gave birth to Adam. Adam's stem cells were taken from his umbilical cord and implanted in his sister. Despite all the success of the treatment and the medical justification, the fact remains that Adam was conceived, not just to be a son, but a medical treatment. Adam was a means valuable only insofar as he carried the right genetic material. If he hadn't, he would have been rejected like the other fourteen discarded embryos. The undeniable conclusion is that we are growing humans for body parts.

CONTEMPORARY MORAL ISSUES OFTEN FOLLOW THE FLOW OF MONEY

Stem cell research and human cloning are about transforming the mystery and majesty of life into a mere malleable and marketable commodity. In the short term, this is big business and offers great fame and fortune to the pioneers and biotech companies who master their secrets and harness the power of life through ESCR.

ESCR CURRENTLY HAS MAJOR DISADVANTAGES

The promises of ESCR are right now nothing more than hoped for possibilities. Successful clinical trials for people are years away at best. Why? The reality is that the scientific evidence so far does not support public statements. First, one minor complication is that use of human embryonic stem cells requires lifelong use of drugs to prevent rejection of the tissue. Second, another more serious disadvantage is that using embryonic stem cells can produce tumors from rapid growth when injected into adult patients. A third disadvantage reported in the March 8, 2001, New England Journal of Medicine was of tragic side effects from an experiment involving the insertion of fetal brain cells into the brains of Parkinson's disease patients. Results included uncontrollable movements: writhing, twisting, head jerking, arm-flailing, and constant chewing. Fourth, a recent report in the Journal Science reported that mice cloned from embryonic stem cell were genetically defective. If human embryonic stem cells are also genetically unstable, that could materially compromise efforts to transform cells extracted from embryos into successful medical therapies. Finally, the research may be hampered because many of the existing stem cell lines were grown with the necessary help of mouse cells. If any of this research is to turn into treatments, it will need approval from the government, which requires special safeguards to prevent transmission of animal diseases to people. It is unclear how many of these cell lines were developed with the safeguards in place. This leads to a host of problems related to transgenic issues.

THE SUCCESS AND PROMISE OF ADULT STEM CELL RESEARCH

In all fairness, adult stem cells have restricted differentiation potential and do not proliferate as well as ESC. On the other hand, while ESCR yields, at best, meager results, and has only far distant possibilities of successful clinical applications, current clinical applications of adult stem cells are abundant! They include treatments for the following: corneal restoration, brain tumors, breast cancer, ovarian cancer, liver disease, leukemia, lupus, arthritis, and heart disease. Thousands of patients are treated and cured using adult stem cells. Alternative sources for adult stem cells include: placenta, cord blood, bone marrow organ donors, and possibly fat cells.

OTHER CHALLENGES

ESC (embryonic stem cells) and their derivatives carry the same likelihood of immune rejection as a transplanted organ because, like all cells, they carry the surface proteins, or antigens, by which the immune system recognizes invaders. Hundreds of combinations of different types of antigens are possible, meaning that hundreds of thousands of ES cell lines might be needed to establish a bank of cells with immune matches for most potential patients. Creating that many lines could require millions of discarded embryos from IVF clinics. Embryonic stem cells have too many limitations, including immune rejection and the potential to form tumors, to ever achieve acceptance in our lifetime. By that time, umbilical cord blood stem cells will have been shown to be a true 'gift from the gods.

[Johns Hopkins University] biologist Michael Shamblott said major scientific hurdles await anybody wishing to offer a treatment, let alone a cure, based on cells culled from embryos. Among the major obstacles is the difficulty of getting embryonic stem cells master cells that generate every tissue in the human body to become exactly the type of cell one wants. Scientists haven't been able to guarantee purity cells, for instance, that are destined to become muscle cells and nothing else... "Transplanting a mixed population of cells could cause the growth of unwanted tissues. The worst case could see stem cells morphing into teratoma, particularly gruesome tumors that can contain hair, teeth and other body parts. Another issue is timing. Stem cells pass through many intermediate stages before they become intermediate cells such as motor neurons or pancreatic or heart cells. Deciding when to transplant remains an open question, and the answer might differ from disease to disease.

- **CONCLUSION**

Embryonic stem cell research, no doubt, may have a noble and far reaching goal to cure the sick, but no matter how good the end may be, it can never be justified by a bad means. Any form of experimentation or research on a human embryo performed on it not for its own benefit but for that of others is unethical and gravely immoral. Any procedure whereby new human life is generated in vitro in order either to use it for implantation and gestation later on or to freeze it or to use it for experimentation purposes is radically unethical and unjust, however good the motivation for doing so may be .A human embryo, no matter what it looks like or how old it is, is a human being and should not be killed for the benefit of others. For these all these reasons my conclusion is that more money should be invested in adult stem cell research and the macabre research associated with ESCR should be abandoned entirely.

References

Ekwutosi c. Bioethics: History and Contemporary Issues, Anambra State, Nigeria, Rex Charles & Patrick limited, 2008

Jonathan B. Stem Cells: A long road ahead, "Baltimore Sun, March 8, 2004

Onuoha J. Ethics at your doorpost; issues, problems and prospects, Umuahia; Seat of Wisdom Major Seminary, 2007

Pantaloon I et al kpim of Moral ethics: General, special & Professional, Ibadan, Heinemann educated books, 2005

J Thomson et. Al Blastocysts Embryonic Stem Cell Lines Derived from Human" 1998

Oxford Advanced Learner dictionary, 7th edition, Oxford University Press, New York, 2006

Merriam Web Online Dictionary

www.stemcell.standford.edu/research/

www.wikipidia/stemcell/research.online.com/

Journal of Medical Ethics, 1998

New Catholic Encyclopaedia, vol. 5, 1967

http://en.wikipedia.org/wiki/Eugenics

http://en.wikipedia.org/wiki/Genetics