

# **Stem Cells and the Life Sciences: Benefits to Humanity or Harm?**

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## **Introduction**

Professor Stephen Hawking, a renowned Physicist from Cambridge University, in a lecture this year said: “Genetic engineering is happening, whether we like it or not... The development of “improved humans” would create major social, ethical and political problems. One thing is possible. Vested in the hands of Humankind is the power to do tremendous good, ...or evil, now that humankind has been given the power to do it...”

Nuclear fission was discovered in the late 1930's, when physicists discovered the formula for bombarding uranium with neutrons. This source of energy was held in great acclaim then, as it was thought that it would alleviate the world's shortage of fuel, food and warmth. Today less than 10% of the world is benefiting from this 'great discovery'. Instead we have come up with weapons for mass destruction.

Despite the inclination to do evil is always present, humankind has been able, through time to harvest the enormous talents in our community to benefit our society (1Cor 12:1-11), so that today we have better living conditions and health than many centuries ago. Nearly 200 years after Jenner discovered a cowpox vaccine to prevent pandemic smallpox, the disease has been eradicated today. As infectious diseases such as cholera, measles, hepatitis B, typhoid are being wiped out by new vaccines and antibiotics, discovered by life science researches, the threat of many of these diseases recurring becomes real, as terrorists plan to use these weapons for human destruction.

Indeed St. Peter has said, “Be alert; be on watch! Your enemy, the Devil, roams around like a roaring lion, looking for someone to devour. Be firm in your faith, and resist him...”(1 Peter 5: 8-10).

## **Where Are We Today?**

In the last two decades, researches in the life sciences have given us improved agricultural products and stock, marine vaccines, robotics, monoclonal antibodies, antibiotics, anti-rheumatic, anticancer and heart improving drugs derived from bacteria, fungal, marine flora or synthesised by human scientists, using molecular cloning, and computerised prediction of protein structure and function. Humanity lives longer today. From single human gene cloning to produce such wonderful drugs like human insulin for diabetes, erythropoetin for correcting anaemias we have moved rapidly like an express train today, to human gene therapy for incurable conditions, (such as advance brain cancers with herpes simplex sensitive to gancyclovir, or a Salmonella “suicide gene” to kill advanced spread of cancer, by making the cancer cells more sensitive to a anticancer drug); to whole human cloning to reproduce “new human beings”, which no longer need the sperm of the father or the ovum of the mother! Scientists have also moved, (by the inspiration of their discoveries), into stem cells (derived from killed embryos, foetuses or from adults), to restore any diseased tissue they want. In some cases they have succeeded, in others they have failed. Many scientists have not paused, reflected and discerned upon their discoveries and its serious impact on human society. As one moves rapidly into these frontiers of medicine, are there any boundaries where Humanity MUST not thread on? Or do we put one step forward blindly and fall into the crevasse below? Where do we seek guidance on ethics and moral issues, from ourselves or from whom?

## **Guidance by Divine Teachings**

“Before the world was created, the word already existed; he was with God, and he was the same as God. From the very beginning the word was with God. Through Him God made all things, not one thing in creation as made without Him. The word was the source of life, and this life brought light to mankind. (John1: 1-5).

When humanity continued to sin, God send messages through His prophets to save them, and from Moses, He set out a covenant with his people in the Ten commandments, for a code of good behaviour.

When humankind continued to disobey His commandments and his covenant, He sent His only son, Jesus Christ (John 1: 14-18) to guide us away from evil and sin, and to come back to Him. How can the divine teachings help us to avoid sin and evil, which greatly tempt us, into believing that the greed for power, wealth and ‘false sense of being God’ is good, regardless of the sacrifice of human life and sufferings?

It is through frequent prayers (every day), remembering His commandments and teachings of Jesus who asked us to show compassion, love and mercy to our brothers and sisters, “Love one another as I have loved you.” (John 13:34). At the beautiful Mount of Beatitudes, Jesus taught the beatitudes, “Blessed are those who are merciful to others; God will be merciful to them!” (Matt.5:1-12). Here Jesus also said, “It is kindness I want, not animal sacrifices.” (Matt.8: 13).

Some of the major boundaries for which we should not go beyond are in the following commandments (Deut.5:1-22).

Thou shall:

1. Worship no God but me,
2. Respect your Father and Mother,
3. Worship no idols. (over zealous greed for power and wealth to the expense of worshipping God; lust; addiction, etc.)

Thou shall NOT:

4. Commit murder (kill physically, and by deception, killing embryos by saying they are not human or living, or the desire to kill a project, or an opponent, etc.)
5. Commit adultery, (doing human embryo sex interchange with other partners, or surrogate mothers),
6. Steal (other’s organs, projects, inventions, plagiarism of others’ discoveries, scientific fraud, deception, etc.)
7. Desire another Man’s wife; his house; his land; his slave; his donkey; or anything else he owns. (e.g. taking embryos’ organs and tissues, or a defenceless person’s organs and tissues.)

## **What Are Stem Cells and Can We Benefit and Not Cause Harm?**

A stem cell is a very primitive cell which can form any tissue in the body, when it is appropriately primed with the specific growth factor protein. They may be a few days old, and called embryos, or remain occult, in adults, and appear in periods of active regeneration.

When a human ovum is fertilised by a sperm, the conceived cell is called a conceptus. Starting as one cell (with 46 full human chromosomes) it multiplies to two, then four, then eight, and finally to a ball of cells, called a blastocyst, a few days after conception. Any of the cells of this blastocyst is a “totipotential stem cell”, and can form a foetus. This blastocyst will then be attached, through its outer layer of cells to form the placenta and umbilical cord. Through this lifeline to its mother’s womb, the embryo receives its life support, growth and protection. The cells within the blastocyst cannot form a placenta, and can only form organs but cannot support life, because of the absent placenta and umbilical cord. These innermass of cells are called “pluripotential stem cells”

These “pluripotential stem cells”, suitably stimulated with a special priming protein, called colony stimulating factor, can form any tissue in the body, e.g. red blood cells, heart muscle cells, skin cells etc. Such pluripotential stem cells are found in the embryo, baby’s umbilical cord blood, adult blood, bone marrow, fat cells, eye, heart muscle and many other adult tissues. These versatile stem cells can form any tissues in the body and are called “multipotential”. In the blood and bone marrow, they replenish our worn out red and white blood cells, and platelets. They are present in every tissue in the adult, and appears during periods of active regeneration.

At the embryo stage, should the embryonic cells in the blastocyst cleave, twins or multiple, identical babies would be formed.

In the next four to eight weeks, it changes from the cellular reproduction stage to a differentiation stage to form human structures, such as face, head, nervous system, skin, digestive system, heart, lungs, genital sex etc. and is now called a foetus. It is about 6mm in length. If the pregnancy is not interrupted a human baby is born at nine months. Medical science even to this day cannot discover the secrets of such an amazing human reproduction from these few cells. Because it contains the full complement of human chromosomes and the human genome,

and is able to reproduce itself on its own, this conceptus is a living human, and is alive from that time of conception.

Biologists and embryologists should look at wonder at this marvel of God's creation, instead of exploiting its tissue for commercial gain, and using contorted language to say it is "pre-human".

Professor Fred Hoyle, an astrophysicist and Nobel Prize laureate for his discovery of the stellar "big bang", described God, as follows: "...Creation of a human being and the universe is like "blowing" up a Jumbo jet, and reassembling the parts again into one whole plane ...it can only be done by God!"

Beneficial aspects of pluripotential stem cells are:

(1) They can be a source of human cells for the testing of drug safety, before these drugs are given to human beings. They can be used for repair of tissue damage, so called "cell therapies" e.g. they can be used to form new cartilage to replace damaged and aged knee cartilages, damaged heart muscles, nerve injuries, burns, diabetes, Parkinson's, Alzheimer's disease, liver, blood cells etc.

(2) Pluripotential umbilical cord stem cells are young, and do not have DNA damage as seen with some adult stem cells, and can be coaxed to form specialised tissues, using specific colony stimulating factor(s). Some of these specialised tissues, such as pancreatic islets, may be coaxed to produce insulin.

(3) Specialise liver cells, developed from stem cells may be used to screen and remove poisonous wastes from liver failure patients.

(4) They can be a source of programmed cells to "kill cancer clones", which are resistant to current treatment.

The disadvantages of embryonic or and other stem cells are:

(1) Through a technique called somatic cell nuclear transfer (SCNT), a ovum is enucleated (the whole genome containing chromosomes), and leaving the shell and nutrients intact, any cell with a DNA can be fused with the enucleated ovum to form an animal such as Dolly. Many animals have been cloned by this method, and there are high foetal losses. Even Dolly and many such cloned animals experienced accelerated aging due to telomere shortening. At the

age of three years, she was already six years, and died shortly after that. This form of reproductive human cloning, proposed by Dr. Severino Antinori, and Dr. Zavos have been condemned by world scientists and by the United States Academy of Sciences this year. This is a research institute funded by the United States Congress to advise it on the advances in Science and technology. Since the need for assisted conception is less than 1%, there is no justification to conduct such experiments, because of the severe congenital defects to heart, pulmonary vessels and the delayed effect of gene damage and regulation, which can take years to express the damage. Now that cross breeding has taken place between animals by this technique, it is not impossible to cross a human and another species, to obtain organs for transplantation in the humanoid. Such human clones will pose additional social problems if they survive, for they have no father or mother, and not accountable to anyone. Their Gods will be the chemicals and artificial DNA that made them, and they will be accountable to no one.

- (2) The destruction of a living embryo, to obtain its totipotential stem cells is a killing of a defenceless human life in the process of reproductive growth. There is no mercy shown to the defenceless embryo, and no sane human couple can knowingly give a proper consent to killing of their own child!
- (3) Embryonic stem cells are vigorous in their growth characteristics, such as proliferation and migration, and often the growth cannot be arrested. Injected into mice they have behaved like primitive cancer cells. Since cancer cells are primitive cells, primed by specialised local growth factors, during a period of gene dysregulation, embryonic stem cells behave in similar fashion. In the US trials on Parkinson's disease, many of the recipients of foetal brain stem cells worsened due to uncontrollable growth of these stem cells. Uncontrollable growth within a confined space of a knee, may lead to undesirable consequences.
- (4) In-vitro cell culture media usually contain nutrients, such as foetal calf (bovine) serum. With the scare of Bovine Spongiform Encephalitis (BSE), and the difficulty in detecting the infectious prion protein, which causes "Mad cow disease", screening safety tests will be expensive if these cell lines are to be used for therapeutic purposes.

- (5) In-vitro methods to produce differentiation of other cells, require specific colony stimulating factor(s). These are present in murine cells, which are used as feeder cells for the human stem cell lines. However murine cell lines expose the recipient to risks of murine viruses, such as murine leukaemia virus, murine pox viruses, and other zoonosis infections. Some of the screening tests are available, whereas others are not. Again, screening these for therapeutic uses will be expensive.

## **Conclusion**

In conclusion, the ideal source of stem cells, with pluripotential function are those derived from umbilical cord blood, which are available in abundance and usually discarded after the birth of the baby. They function just as well as embryonic stem cells. Used wisely, they would bring tremendous benefit to humanity and should be encouraged.

Today umbilical cord stem cells, are established treatments for first and second remissions of acute lymphoblastic leukaemia, acute myeloid leukaemia, severe aplastic anaemia, Myelodysplasia, Congenital immunodeficiency syndromes, Hodgkin's and Non-Hodgkin's Malignant Lymphoma, and some solid tumours. Experimental uses have started to show benefits in some stroke and Alzheimer's patients and juvenile arthritic patients. However, therapeutic uses will pose serious challenges on safety.

Embryo destruction and human reproductive cloning will face serious ethical and moral challenges, which will lead to the banning, or the impediments of the use of these products in many countries.

As elders in our society and "shepherds" looking after a flock, would Jesus not ask us, "Do you love me more than these?" (John 21: 15-19). And as we reflect on his question... Are we using the knowledge and wisdom of science, and of stem cells, wisely to benefit his children, or are we more tempted by greed and overzealous acquisition of wealth, to pursue procedures which are detriment to the sanctity of the life of young human embryos placed in our hands?

Finally, when we come face to face with Jesus in the last judgement, (Matt 25:31-46), and He asks us, “Did you look after the least of my people and the helpless embryos, instead of allowing them to be killed”...how and what would our answer be.

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