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A NORMATIVE ANALYSIS OF THE SOUTH AFRICAN LAWS, REGULATIONS AND PROFESSIONAL GUIDELINES REGARDING HUMAN EMBRYONIC STEM CELL RESEARCH AND THERAPIES

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808912

A Thesis submitted to the Faculty of Health Science, University of the Witswatersrand, in fulfillment of the degree of Doctor of Philosophy

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DECLARATION

I, *Fikile Muriel Mnisi,* declare that this thesis is my own work. It is being submitted in fulfilment of the requirements for the degree of PhD (Bioethics and Heath Law) at the University of the Witwatersrand, Johannesburg. It has not been previously submitted for any degree or examination at this or any other University.

_____

(Signature of Candidate)

_____day of _____2018_____in_____

DEDICATION

In the memory of my uncle

Vusimuzi Kingsley Mnisi

1959-2006

PRESENTATIONS ARISING FROM THIS THESIS

1. International Conference on Tissue Engineering and Regenerative Medicine (ICTERM). 27-31 August 2014. Tshwane University of Technology, Pretoria, South Africa. Paper presented: "Questioning the application of the principle of subsidiarity for human embryonic stem cell research in South Africa".
2. The Second Gene and Immunotherapy Conference. 26-16 September 2015. University of Science, Vietnam National University. Ho Chi Minh City, Viet Nam. Paper presented: "Questioning the application of the principle of subsidiarity for human embryonic stem cell research in South Africa."
3. The 4th Conference of The International Association Education in Ethics (IAEE). 25-27 May 2016. The National Centre of Documentation of Bioethics, The Centre of Biomedical Research of La Rioja (CIBIR) and The Rioja Healthcare Foundation (Fundación Rioja Salud). Logrono, La Rioja, Spain. Paper presented: "A normative case for the patentability of human embryonic stem cell technologies."
4. The 2nd PCS (Pioneer Century Science) Cell Science & Stem Cell Conference (CSSC-2017). 8 & 9 July 2017. Rome, Italy. Paper presented: "Are human embryonic stem cell patents morally justifiable? – An African analysis based on Ubuntu ethics".

PUBLICATION ARISING FROM THIS RESEARCH PROJECT

1. A Normative Case for the Patentability of Human Embryonic Stem Cell Technologies. *Safety, Ethics and Regulations*, Chapter 5 (2017) 121-153. ISBN 978-3-319-59165-0. Springer e-book. From: http://link.springer.com/chapter/10.1007/978-3-319-59165-0_5.

ABSTRACT

Human Embryonic Stem Cell (hESC), like any other Biotechnology comes, not only with the potential to advance scientific knowledge and therapeutic development, but also with ethical controversies. These controversies not only affect scientific growth but also how the technology will be governed through policies and the legal framework.

This study normatively analyzes the effect that the South African laws, regulations and professional guidelines have on hESC research and therapies. Three theoretical ethical approaches are applied in order to normatively analyze the legal regime, namely: Ubuntu, Ethics of Responsibility and Social Contract. The study argues that the legal framework is not clear and lacks coherence in how hESC research and therapies are regulated. Based on the findings, I propose an ethical policy framework for hESC research and therapies that may ensure flexibility and facilitation of growth and development for hESC technologies within South Africa and Africa.

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LIST OF ABBREVIATION AND SYMBOLS

AIDS : Acquired Immune Deficiency Syndrome

AHRA : Assisted Human Reproductive Act

ANT : Altered Nuclear Transfer

ART : Assisted Reproductive Transplant

ASC : Adult Stem Cell

BAC : Bioethics Advisory Committee

BBBEE : Broad Base Black Economic Empowerment

BSA : Benefit Sharing Agreement

CIHR : Canadian Institution of Health Research

DNA : Deoxyribonucleic acid

EG : Embryonic Germ

EPC : European Patent Convention

EPO : European Patent Office

EPC : Endothelial Progenitor Cell

ESC : Embryonic Stem Cell

E.U : European Union

FDA : Food and Drug Administration

GC : Germ Cell

hESC : human Embryonic Stem Cell

HFEA : Human Fertilization and Embryology Authority

HGP : Human Genome Project

hiPSC : human induced Pluripotent Stem Cell

HIV : Human Immunodeficiency Virus

HLA : Human Leukocyte Antigen

HPSCA : Health Professions Council of South Africa

HSC : Haematopioetic Stem Cell

HUGO : Human Genome Organization

ICM : Inner Cell Mass

ICMR : Indian Council of Medical Research

IP : Intellectual Property

IPR : Intellectual Property Right

iPSC : induced Pluripotent Stem Cell

ISSCR : International Society of Stem Cell Research

IVF : *in vitro* fertilization

MEXT : Ministry of Education, Culture, Sports, Science and Technology

MOST : Ministry of Science and Technology

MRC : Medical Research Council

MSC : Mesechymal Stem Cell

MTA : Material Transfer Agreement

NAC-SCRT : National Apex Committee for Stem Cell Research and Therapy

NAS : National Academy of Science

NHA : National Health Act

NHMRC : National Health and Medical Research Council

NIH : National Institution of Health

NIPO : National Intellectual Property Management Office

NREC : National Research Ethics Committee

OSKM : Oct4, Sox2, Klf4 and M

OSNL : Oct4, Sox2, Nanog and Lin28

PGD : Pre-implantation Genetic Diagnosis

REB : Research Ethics Board

REC : Research Ethics Committee

S.A : South Africa

SASRSS : South African Society of Reproductive Science And Surgery

SOP : Standard Operation Procedure

SNCT : Somatic Nuclear Cell Transfer

UCLA : University of California, Los Angeles

U.K : United Kingdom

U.N : United Nation

UNESCO : United Nations Organization for Education, Science and Culture

U.S.A : United State of America

TCPS : Tri-Council Statement: Ethical Conduct for Research Involving Human

WARF : Wisconsin Alumni Research Foundation

WHO : World Health Organization

WIPO : World Intellectual Property Organization

WTO : World Trade Organization

LIST OF DEFINITIONS

African philosophy : Philosophy based on ethical principles and decision using African values, virtues and standards, i.e. based on Ubuntu

Chimeras : An organism containing a mixture of genetically different tissues, formed by processes such as fusion of early embryo, grafting, or mutation

Embryo : 14 day old unborn human offspring in the process of development

Embryo splitting : May refer to (i) the spontaneous, natural way in which identical twins are formed, when artificially induced, a method of cloning , or (ii) the splitting of an embryo to create more than one human.

Homo sapiens : The primate species to which modern humans belong, humans regarded as a species

Hybrid : The offspring of two plants or animals of different species or varieties. In the case of hESC this is the offspring of human and animal combined to produce an embryo

Oocyte : An immature eggs cell of a human ovary

Reproductive Cloning : This is the deliberate production of genetically identical individuals for the purpose of creating an individual or human

Somatic Nuclear Cell Transfer: A laboratory strategy for creating a viable embryo from a body cell and an egg cell. Thus, by taking an enucleated oocyte (egg cell) and implanting a donors nucleus from a somatic (body) cell

Sperm : Male sex cell or semen

Western philosophy : Philosophy which uses ethical principles based on Western normative analysis and ethical theories

Zoonosis : An infectious disease that is transmitted from animals to humans

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Since the first successful culturing of the Human Embryonic Stem Cell (hESC) line by Thomson in 1998, hESCs have been at the centre of many ethical, legal and social issues and controversies. Culturing of these cells (in the laboratory) was an important breakthrough, as it opened doors in understanding the basic biology and mechanisms of human development, with important implications for the development of cell replacement and regenerative therapies. As a result of their theoretical usefulness, research on hESC technology has, ever since their first 'discovery', attracted increasing attention (Löser *et al*. 2010, p. 240).

Scientifically, hESCs have been reported to be capable of proliferating indefinitely and differentiating into cell types of any part of the body (Löser *et al*. 2010, p. 240). This makes them more versatile than other stem cells such as Adult Stem Cells and Induced Pluripotent Stem Cells (iPS) and as such are more attractive for scientific and clinical purposes. hESCs have the potential to differentiate into endodermal, mesodermal and ectodermal progenitors cell lineages (Matthews 2009, p. 3), they are capable of self-renewal and are immortal (capable of indefinite growth and division). HESCs are reported to be useful for embryogenesis, drug discoveries and transplantation medicine (Plomer, Taymorks & Scott 2008, p. 13). As a result, this technology has the potential to benefit humanity and medical research, with some of the benefits and applications including:

- research of early human development.
- treatment of diseases and afflictions such as Parkinson's disease, Alzheimer's disease, diabetes, spinal cord injury, stroke, burns, retinitis, and organ failure (deWert& Mummery 2003, p. 673).
- the ability to grow whole organs. It is hoped that if this can be successfully done, this would alleviate chronic shortages of organs available for transplant, by enabling researchers to grow their own organ supply by means of hESC (Moller 2008, p. 3).
- drug screening on hESC lines for research on the toxic effects of drugs (deWert & Mummery 2003, p. 673). This is significant especially for ethical reasons, since this technology could reduce our current reliance on the use of animals in medical research.

What is clear is that there are many very important ways in which hESC research could lead to medical advances that would be of enormous value to humankind.

Despite these potential benefits, the issue of the use of hESCs in research and therapies remains mired in controversy, more especially ethical controversy. The main ethical issue relates to the moral status of the embryo, in particular whether a human embryo should be considered a person. Mainly the issues revolve around two concerns: the morality of destroying embryos and moral distinctions based on the source of embryos. The potential sources of embryos are: embryos created by means of *in vitro* fertilisation (IVF) for reproduction purposes, IVF embryos (oocyte-sperm fertilisation) created specifically for the purpose of stem cell isolation, embryos created through somatic nuclear transfer (therapeutic cloning), and embryos obtained from fetal tissues during abortion procedures (deWert & Mummery 2003, p. 673; Dhai *et al*. 2004, p. 906-907; UNESCO: The use of Embryonic Stem

Cell in Therapeutic Research 2001, p. 10). Some commentators claim that there are different ethical implications to using embryos from these different sources. The moral status of the embryo has been the subject of serious debate for decades, with society being divided as to whether or not an embryo holds a moral status equivalent to that of a fully developed human being. For those who regard the embryo as having the status of a person, an appeal is often made to the right to life as the basis for rejecting hESC research and therapies. On this basis hESC technologies are viewed as being against the right to life, integrity and offensive to human dignity and personhood (Caulfield & Ogbogu 2012, p 13). Caulfield & Ogbogu (2012, p. 3) further state that those who claim that an embryo does not have the moral status of a person are more inclined to be in favour of hESC research and therapies.

These issues and controversies are not new and have been the subject of academic dispute since the earlier debates about abortion and IVF. Furthermore, a significant body of academic literature already exists that has given considerable attention to these related moral controversies, including the question of whether hESC research and therapies are ethically justified. My project will, of necessity, reference this body of literature and give an account of the various positions taken on the fundamental ethical issues related to the use of hESCs in medicine and research. But, this is not the main focus of my intended research. Whatever view one holds on the desirability and morality of hESC research and therapies, these endeavours are ultimately constrained by the law, regulatory frameworks and professional guidelines applicable in any specific jurisdiction. Assuming as I do that there are good ethical grounds for defending the use of hESC technologies because of their enormous potential in promoting human health, very little of this potential could be harnessed without a legal and regulatory framework that supports research and development in this area of science. If there are no solid ethical grounds upon which to prohibit these technologies, then a legal and

regulatory regime that does not facilitate research in this area could be argued to be morally unjustifiable in itself, as it would be a serious hindrance to the development of medical technology that could do an enormous amount of good in terms of promoting health and alleviating suffering. My research question focuses on whether the current legal and regulatory framework in SA (including existing professional guidelines) can be morally justified or not. That is, I seek to answer this question:

Are the current South African laws, regulations and professional guidelines regarding hESC research and therapies morally justifiable?

In terms of current South African (SA) law, abortion is permitted at the request of the pregnant woman, until the end of the 12th week of pregnancy (Choice on Termination of Pregnancy Act of 1996, section 12 (1)(a)), and under other specific conditions after the first trimester. Legally an embryo or fetus is regarded as part of the mother. It is not regarded as an independent bearer of rights and is not afforded the same legal status as a born human being (Dhai *et al*. 2004, p. 907; Sithole 2011, p. 55). It can therefore be concluded that a fetus' right to life is not protected by the SA Constitution in section 11. Moreover, an embryo is not legally afforded the same protection as a born human being. In stark contrast to this, the National Health Act of 2003 (chapter 8, 57(4)) prohibits hESC research, with the exception of the use of stem cells and zygotes of less than 14 days old, with written permission of the Minister. (Thus, the law seems to only permit the use of supernatant IVF embryos and not the other sources of embryo harvesting for hESCs). There seems to be no *prima facie* grounds for this prohibition of certain sources for hESC research, under a legal framework in which the fetus is regarded as having no legal standing or moral status. At the very least, it appears as though there is an inherent inconsistency in our law. If it turns out that on the basis of ethical

analysis, there are no strong grounds for regarding hESC research as morally wrong, then it would seem that this is one aspect of the law that could plausibly be judged to be ethically unjustifiable. This is especially so, because prohibition in this case could severely hamper the development of medical knowledge and therapies that have the potential to save many lives and alleviate a great deal of suffering. There is a need for the National Health Act and other laws and regulations regarding the use of hESCs to be carefully scrutinised and ethically evaluated.

A second main area of law that has an impact on the development of medical technology using hESCs relates to Intellectual Property Rights (IPR) and Patenting. Embryonic Stem Cell technology just like any other stem cell technology that falls under the category of a Biotechnological invention is not likely to be developed without protection of the IPRs of the inventors. Biotechnology and Pharmaceutical companies that invest in research and development often rely on the financial incentive promised by the protection of their intellectual property as a basis for investment. Against this background, these Biotechnology companies have been showing a great interest in stem cell technologies for research, cell therapies and drug and development purposes (Einerhard 2011, p. 277). However, returns on investment as well as commercial profits are generally expected by these companies, which gives rise to another set of ethical, legal and social conflicts and issues.

Human ESC patents are therefore at the centre of another set of ethical controversies. On the one hand, it is unlikely that funding for research will be available unless patenting laws in some way ensure that sponsors are able to get a reasonable return on their investment. On the other hand, moral questions regarding fair resource allocation, exploitation and infringement

on human dignity arise surrounding these 'patents of life' as they are often called. Furthermore, the patents that these Biotechnology companies often seek may lead to lucrative (and possibly even excessive in the opinion of some observer's) profits for the sponsoring companies, researchers and the government, to the exclusion of benefitting the patients or participants that make the research possible. In addition, these ethical concerns are also exacerbated by the commercial value that may be placed on these technologies, with many commentators being concerned with the moral implications of human beings being perceived as commodities.

Under the current South African patent law[1] 'patents of life' are seemingly legal, based on the standard criteria upon which patents are granted, namely:

- novelty
- involving an inventive step
- and industrial applicability

According to Drysdal (2004, p 253), "a patent grants the patentee the right to secure a monopoly over his/her invention in exchange for sharing his/ her invention. In no way does a patent give the patentee any right over the human being from whom the sample was obtained". It only allows property rights over the invention or data which may emanate from the hESC line or research.

Despite the above, the definition of ownership[2] that a hESC patent may allow and facilitate for economic purposes has the potential to lead to conflicts with society's understanding of

[1] Drysdal 2004, p. 253; Rutz 2009, p. 14; South African Patent Act *1978*

what may or may not be owned, particularly with regard to the human body and human life research. Therefore clarity on these issues and technologies is of paramount importance. In Europe for instance, hESC patents are regarded as immoral and unethical due to the *ordre public* and morality clause, which is a criterion for exclusion on Biotechnology Invention Patents. Plomer, Taymorks & Scott (2008, p. 13-15) report on two cases based on hESC lines where the European Patent Office (EPO) had revoked patent applications, one for commercialisation or industrial use and the other case is the Oliver Brüsle patent. (The Oliver Brüsle patent was declined by the German Federal Supreme Court in the case known as the *Brüsle vs Greenpace* case, based on the morality clause as stated in Art. 6 (2) of the Biotech Patents Directive (98/44/EC) (Plomer, Taymorks & Scott 2008, p. 15)). Furthermore, the European Union adapted the 'Directive on Biotechnology Invention' by means of an ethics clause in the directive. This clause clarifies what falls under *ordre public* and morality. European countries are the only countries that have such an ethics clause and actually use it as a criterion for exclusion of Biotechnology patents (especially hESC patents). The South African Patent Act section 27 (2) and section 36 (1) also includes an *ordre public* and morality clause. Whilst there have been no reported cases of any Biotechnology patents that have been revoked on the basis of this clause, the potential exists that it could be used to prevent patenting of hESC technologies, thus disincentivising research in this field. Clarity on this aspect of the law is required. At the very least, it is necessary for standards or guidelines to be developed clarifying this *ordre public* and morality clause in our law.

In addition to this, ethics guidelines on Biotechnology patents, especially hESC patents, may help to minimize unjust commercial exploitation of these patents. Cases such as those of

[2] Ownership as defined by the *legal-dictionary.com,* is a legal title coupled with exclusive legal right to possession.

Henrietta Lack (Hela Cells), *Moore vs. Regents of University of California*, and Ted Slavin[3] are examples of cases that have prompted questions regarding distributive justice. One of the questions which has been asked is whether patients or participants hold property rights over their own tissue once it has been removed. Another issue relates to what benefits (shared-benefit, direct and indirect) they should be offered in the case of commercial development from their tissue samples. Truog, Kesselheim & Joffe (2012, p. 37) claim that "injustice occurs when companies do not share benefits with participants". However, they also concede that this does require a more critical examination before it becomes acceptable as precedent regarding payment of participants.

Some are of the opinion that the importance of patent protection lies not so much in its facilitation of maximum economic benefit to the patentee, but rather in its contribution to the achievement of certain human and cultural rights (Salt & Salt 2013, p. 287-288). Salt & Salt (2013, p. 287-288) also claim that "legal authorities need to know which set of values need to be applied in order to evaluate hESC patents in terms of the *ordre public* and morality ethics clause. These values also need to be grounded on strong ethics principles and guidelines". Thus, the law, regulations and professional guidelines that govern the use of hESCs in research and for therapeutic purposes can either hinder or facilitate the development of important medical knowledge and technologies.

[3] Ted Slavin was hemophiliac and he became exposed to hepatitis B through blood transfusion treatment. As a result of an extremely high concentration of valuable hepatitis B antibodies in his blood, Slavin's cells were found to produce valuable proteins that were important for scientific research. Thus, upon being informed by his doctor Slavin decided to sell his serum to pharmaceutical companies and researchers because he felt that his cells were not just a part of his body but his business. Contrary to the ways in which it usually works in science, he decided he would maintain complete control over any blood or tissue removed from his body. Moreover, he would also determine who would use them for research, how they would be used and most importantly who made money from them (Skloot 2006, p. 1) http://www.nytimes.com/2006/04/16/magazine/taking-the-least-of-you.html?referer=http://www.google.com.

With all that said, it is important firstly for me in this thesis to articulate and defend a normative position on the moral justifiability for using and harvesting hESCs for both research and therapeutic purposes. In the light of this normative position, I will then be able to further evaluate the current legal and regulatory framework against this normative position in terms of:

- The law, regulations and guidelines directly addressing the use of hESCs
- Patenting laws which could have implications for this kind of research and development

As a result of this analysis, I will then be in a position to recommend legal or regulatory reforms that might be ethically required, as well as suggest possible guidelines for the ethical use of hESCs in research and therapy.

1.2 RATIONALE

Human Embryonic Stem Cells' immortality and other properties that they uniquely possess set them apart in terms of their potential to unlock new medical discoveries which can be of enormous value to humankind. If it can be successfully argued that there are no convincing moral grounds for research and therapies using hESCs to be morally prohibited, then it can also be argued that the law and regulations are themselves morally unjustifiable unless they facilitate the use of these technologies to the benefit of human health and well-being. If, on the other hand, hESC-based technologies are fundamentally morally wrong, then the law would be remiss if it did not circumscribe such activities. Either way, the law, regulations and

professional guidelines regarding the use of hESCs in South Africa need to be subjected to careful analysis and evaluated ethically.

A considerable body of literature currently exists which deals with the fundamental moral issues related to the use of hESCs. I will draw on this literature primarily to assist me in defending a prescriptive normative position on the use of hESCs. Whilst my discussion of the debate and various positions does not qualify as a novel contribution to the field, my own argument in this section will. What is novel about my research is that it is the first comprehensive ethical appraisal of current South African laws, regulations and professional guidelines regarding hESC research and therapies. To my knowledge, no comprehensive single descriptive account of all of the laws, regulations and guidelines that have implications for the use of hESCs exists. Providing such an account is, therefore, on its own a valuable contribution. A normative appraisal of this regulatory framework will be a novel contribution to bioethical scholarship. Furthermore, the subject of the ethics of the patenting of discoveries based on hESC research is still relatively unexplored, internationally, and my project could potentially add new insight to the ongoing moral debate in this regard.

Given the potential benefits of research and therapies based on hESCs, economically (as hESC therapies can be turned into innovations that can become commodities in the future) as well as in terms of the prevention of deaths and the promotion of health and well-being, establishing our moral obligations regarding the use of hESCs is a very important aim. It is also important that our legal and regulatory framework be morally justifiable. For these reasons, I believe that my research project is both important and timely.

1.3 OBJECTIVES

My main research objectives were:

- To normatively evaluate the current South African laws, regulations and professional guidelines regarding hESC research and therapies
- To normatively evaluate the current South African laws, regulations and professional guidelines with respect to the patenting of discoveries derived from hESCs
- To develop an ethical framework to guide any necessary reforms of the current South African laws, regulations and professional guidelines with respect to hESC research and therapies and the patenting of discoveries derived from hESCs

1.3.1 Sub-objectives

In order to fulfil the above objectives, the sub-objectives required were:

a. To articulate and defend a prescriptive normative position on the major ethical issues related to hESC research and therapies (including patenting of related discoveries). However, before that I have given a summary of some of the arguments used for and against the use and harvesting of hESC for research and therapeutic purposes.
b. To compare both scientifically and ethically the differences (in terms of advantages and disadvantages) between hESCs against both Adult Stem Cells and Human iPSCs (hiPSCs), in order to understand why hESCs may still be required as a source for stem cell research and therapies.

c. To articulate and defend a prescriptive normative position on what the provisions of the law, regulations and professional ethical guidelines related to hESC research and therapies (including patenting of related discoveries) ought to be, based on the position defended in (a) above.
d. To evaluate the current South African laws, regulations and professional guidelines against the prescriptive normative position defended in (c) above.
e. Based on the evaluation in (b and d) above, to identify necessary reforms of the current South African laws, regulations and professional guidelines with respect to hESC research and therapies and the patenting of discoveries derived from hESCs.

1.4 METHODS

1.4.1 Study Design

The study is essentially of a normative nature. As described by Sugarman and Sulmasy, "Normative ethics is the branch of philosophical… inquiry that sets out to give answers to the questions: What ought to be done? What ought not to be done? … Normative ethics sets out to answer these questions in a systematic, critical fashion, and to justify the answers that are offered" (Sugarman and Sulmasy 2001, p3). The main focus of the normative analysis is the current SA law, regulations and professional guidelines relating to hESC research and therapies. As such, the study might alternatively be described as ethico-legal, inasmuch as it

is the legal/regulatory framework itself that is being normatively assessed. In studies of this type, the normative questions asked take the form of:

- What ought the law to prescribe?
- What ought the law to prohibit?
- What guidelines ought to be recommended?

Since this was a pure normative study it was based on desktop and library based research. No new data was collected or analysed. The research did not involve study participants. It drew from the law and literature relevant to the topic. I employed the typical research methods and standards applicable to philosophical research. This primarily involved the interpretation and critical analysis of relevant texts. Which involved the definition and clarification of concepts, the identification and criticism of assumptions, the analysis and evaluation of theoretical frameworks, the development and defences of arguments, the use of counter-examples, and the articulation of the most plausible interpretation of significant concepts found in the sources.

An important aspect of the research was to engage in a comprehensive review of the existing literature on the ethical controversies surrounding hESC research and therapies and related topics, such as debates on personhood and the moral status of the embryo. It was also necessary to give attention to the literature on the ethical evaluation of the law. Research also needed to be done in order to provide a comprehensive descriptive account of the law, regulations and professional guidelines in South Africa that were of relevance.

Literature surveys and studies were conducted by means of internet search engines such as Google Scholar and electronic databases of scientific journals and books as well as legal resources (for example, PubMed, Jstor, Science Direct, Juta Law Online Publications, Sabinet). Examples of phrases and keywords which were used include: bioethics and hESCs, moral status of hESCs, morality of hESC patent, distributive justice and benefit sharing, justice and hESC research and therapies, international laws, regulation and guidelines regarding hESC research and therapies.

In developing my arguments I had to draw on a number of moral theories and theoretical perspectives on ethics. Current literature reveals that the moral status of hESC research and therapies have been viewed from various religious perspectives, as well as other different moral theoretical positions including: Utilitarian, Kantianism and the Ethics of Responsibility. I critically relied in particular on the Ethics of Ubuntu, Ethics of Responsibility and Social-Contract Theory, regarding or analysing the law, regulations and professional guidelines. hESC research and therapies have not been morally evaluated in terms of Ubuntu, or African ethics, until now. Doing so has been enlightening and enriched the debate about the ethics involved in the use of hESC technology. Drawing on the rich resources of moral philosophy, both Western and African, I was able to strongly defend a normative judgment on current laws, regulations and professional guidelines regarding hESC research and therapies in South Africa.

1.5 OVERVIEW OF THE CHAPTERS

The title of this study is "A normative analysis of the South African laws, regulations and professional guidelines regarding human Embryonic Stem Cell research and therapy". Chapter 2 deals with, identifying and discussing the ethical issues and principles used to argue for and against the moral status of the human embryo. I reviewed all the ethical principles which were used for and against hESC research and therapy such as those of Utilitarian, Consequentialist and Personhood arguments, for which are mainly based on Western philosophy and point of views. I summarised all these arguments including those dealing with the different sources of human embryos for research and therapy. Thereafter, I analysed the moral status of the human embryo using Ubuntu- an African philosophy- to evaluate the moral status of the human embryo within an African context and point of view. Moreover, to distinguish if there are differences and/ or similarities of persenhood between African and Western philosophy.

Chapter 3 deals with the alternative stem cell technologies for hESC research and therapies which may be better sources for stem cell technologies, because it is stated that they show little to no ethical issues and controversies. These alternative stem cell technologies have the 'same' or similar properties to hESCs and there is no destruction of the human embryo, thereby eliminating all the issues and controversies regarding the moral status of the embryo. I therefore analyse their technical, manufacturing and ethical issues and weigh them against hESC technology to compare and evaluate if these indeed could be better alternatives stem cell sources, and whether they could be used for stem cell harvesting instead of the human embryo. These alternative stem cell sources included: Adult Stem Cell (ASC) and Human

Induced Pluripotent Stem Cell (hIPSC). This chapter is imperative to my study especially since hIPSCs are claimed to function and behave like hESCs.

Chapter 4 deals with and addresses issues concerning the morality of hESC patents in both Western an African context. This is to review if hESC patents are morally justifiable and accaptable by reviewing some of the debates on biotechnology patents and their social effect. Although this was never debated using African philosophy however, this chapter seeks to provides light in the importance of differences between the moral status of the human embryo and the morality of hESC patents. Furthermore, to understand this morality based on an African context and how this can affect not only the society but policies and legal framework Chapter 6 deals with and analyses the South African legal and regulatory framework. Chapter 7 then deals with the normative analysis of the law, regulations and professional guidelines. I chose three normative principles to analyse and discuss the ethical framework of the laws, regulations and professional guidelines and these were: Ubuntu, Ethics of Responsibility by Hans Jonas and Social Contract by John Moore.

Chapter 8 was the formulation of the policy framework for which I make certain suggestions and recommendations that may be applied for hESC research and therapy in SA. through the laws, regulations and professional guidelines. These recommendation if applied will facilitate an environment for hESC research and therapy that will promote Ubuntu, Ethics of Responsibility and Justice (i.e. Justice as Harmony rather as illustrated within the text). Chapter 9 is the overall conclusion chapter.

1.6 LIMITATIONS

Some of the limitations in this study is not being able to gaurantee a comprehensive analysis and study regarding the legal and regulatory framework of hESC research and therapy, albeit I do try to. In order to be able to analyse this extensively it will require more than a Ph.D moreso since the law is ever changing and keeping up with the all the changes while focusing on the study was challenging. Moreover, these Act do not have a comprehensive supplementary regulation which directly deal and address hESC as well as policies concerning this matter making it challenging to have an analysis concerning this subject matter. More especially with IPR and patent laws, there is little (if nothing at all) on hESC patents including other biotechnology patents as a whole. Lack of policies and regulations that directly deal and address biotechnology and related patents is not yet formed and put into place. Apart from the law, scientifically there are always new studies and argument that are being published regarding the moral status of the embryo of which I could not address as they were outside the scope of my study but still indirectly related to by study. For example, the recently published paper on BMC Medical Ethics by Guilia Cavaliere title "A 14-day limit for bioethics: the debate over human embryo research". This paper no longer focuses on the debate regarding the moral status of the embryo but on the 14-day statutory limit which make the moral status debate 'outdated', even though this has not been debated within an African context. Apart from not having debate on the moral status of the human embryo within an African context, there is also no studies on the morality of IPR (in a form of hESC patent) by appliying Ubuntu as an ethical principle. Other limitations was my academic background, as a trained scientist this did put some limitations in the my style of writing, understanding and interpretation of both the law and philosophical principles.

CHAPTER 2: MORAL STATUS OF THE HUMAN EMBRYO.

2.1 INTRODUCTION

Human Embryonic Stem Cells have been shown to be able to differentiate indefinitely into specialised progenitor cells of the mesodermal, ectodermal and endodermal types respectively, and are also immortal. These characteristics make hESCs extremely desirable to work with in developing stem cell technology in facilitating our understanding of basic biology and in the development of reproductive biology. Furthermore, they are potentially useful in the generation and improvement of therapies for certain diseases, especially genetic disorders. In addition, they have been shown to offer much promise with respect to the possibility for major advances in healthcare and the alleviation of human suffering, due to their ability to be cultured long term and indefinitely and further be developed into specialised tissues or differentiated states. However, hESC research has been steeped in controversies, particularly to ethical, legal and social issues for more than a decade now (Robertson 2010, p. 191).

Human ESC lines are derived from the Inner Cell Mass (ICM) of the blastocysts (200-250 cells) and these are in their pluripotent state. The cells can then be harvested by first removing or separating the trophoblast (outer layer of the blastocysts) cells from the ICM. The ICM is then cultured in culture plate with ‘feeder’ cells. These ‘feeder’ cells maintain the stem cells and a single cell is isolated and grown (Figure 2.1). Cells that are successfully

grown are tested to see if they possess a high level of telomerase (an enzyme required for growth and division of the cell). Telomerase also maintains the normal chromosome known as the karyotype and length. A high level of telomerase is a characteristic only of cells with an unlimited potential to divide (The New Atlantis 2012, p. 63 & Liao 2006, p. 9). Therefore, hESC exhibit the following characteristics:

- Pluripotency (being able to differentiate into many types of tissue or different cell lineages)
- Immortality (the ability to divide indefinitely without losing genetic structure)
- Malleability (the ability to be manipulated without loss of function) and the ability to express the enzyme telomerase

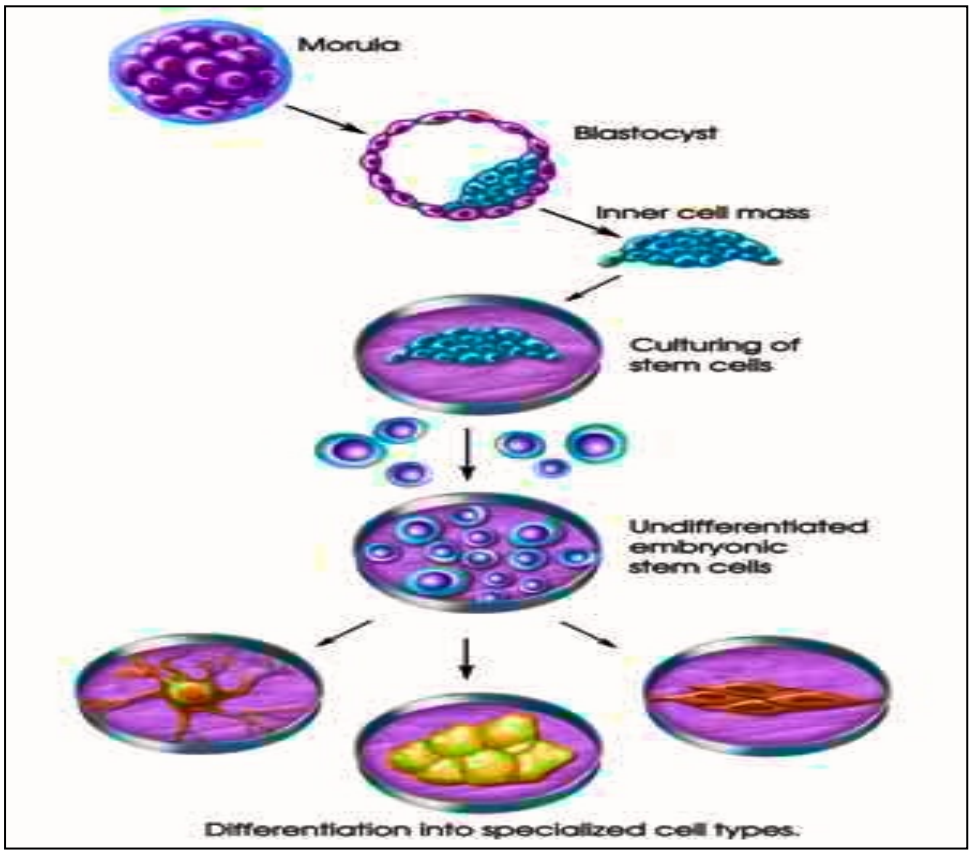


Figure 2.1 Human Embryonic Stem Cell derived from the Inner Cell Mass, harvested and cultured to produce different cell lineages (The National Academies 2005, p. 4) (Permission to use the figure has been obtained from the editor).

Research using hESCs will not only significantly expand what we know about cellular life and basic biology, but it has also theoretically been shown to have potential and important clinical benefits. Whether or not these claims will prove exaggerated awaits further research efforts. However, as a society we long for such clinical benefits and a sense of genuineness (regarding the motives of those involved in hESC research, whether or not their motives is for the benefit of society or theirs only) of those involved in this research (Outka 2002, p. 175-176). The use of hESC lines for regenerative medicine to treat many diseases would make it possible to transform the innate biological capacities of the human body into biomedical products for the benefit of all. However, Harvey (2009, p.51) makes a claim that this is currently limited, but predicted that the next set of therapies expected from hESC research will be available in 2019. Despite this potential therapeutic promise, hESC research has stirred persistent ethical concerns and has been challenged by heated debates and opposition because the research involves the destruction of the human embryo (The New Atlantis 2012, p. 11). Important ethical concerns have been raised regarding hESC research, which were primarily issues relating to the destruction of the embryo, the sources of these human embryos (Nuffield Council of Bioethics 2000, p. 8), concerns about undue pressure on couples or 'parents' of the embryos, as well as women participating in the *in vitro* fertilisation (IVF) programmes who are needed to donate oocytes for human embryo research. Some have claimed that the current practice opens doors for the exploitation of women for the supply of their oocytes for research, the deliberate creation of human embryos for research purposes and the consequent destruction of the embryos. There are also concerns expressed about the possible commodification of embryonic stem cells and scientific discoveries based on them (Harvey 2009, p. 52).

Human ESC research has made it necessary to consider the moral status of the human embryo. In the same way as this core moral question has been central to debates on non-therapeutic abortion, it is still so with the use of the human embryo in research. Thus far, the issue of the moral status of the human embryo as a source for hESCs remains contentious and unresolved. A clear understanding of the moral status of the human embryo and its sources will help answer and reduce fears pertaining to hESC research and therapy. Therefore, we need to determine what is 'good' or 'right' and what needs to be done (and how) in order to attain that 'good' or 'right' in nature. This can be possible through the use of moral principle(s).

In this chapter I will start by discussing the moral status of human embryo, albeit this has been done, however the moral status of the embryo in an African perception has not yet been analysed for harvesting and use in hESC research and therapies. It was necessary for me to first discuss the ethical arguments that have been proposed for hESC research and therapy, first from the Western normative arguments before I can build my arguments and discourse from an African normative argument using the principle of Ubuntu. I provide an overview of the various ethical issues and how they have been addressed in the existing literature, thereafter discuss these issues within the context of Ubuntu and draw my conclusion based on this for hESCs within a SA legal regime.

2.2 SOURCES OF HUMAN EMBRYONIC STEM CELLS

There are various sources used for harvesting and culturing of the human embryo for hESC research and these sources raise different moral concerns. These sources include:

- The use of 'spare' or 'surplus' or 'left-over' or 'supernatant' embryos from IVF.
- Fresh embryos.
- Embryos created for research.
- hESCs created by means of Somatic Nuclear Cell Transfer (SNCT)
- Aborted fetus (also known as Primordial Germ Cell (GC) or cadaveric fetal tissue).
- Other procedures such as; Altered Nuclear Transfer (ANT), Pre-implantation Genetic Diagnosis (PGD).

(The New Atlantis 2012, p. 64-66 & Nuffield Council of Bioethics 2002, p. 8).

Before I start analysing and discussing the normative debates concerning the moral status of the embryo, I will first discuss the ethical issues that surround the specific sources for harvesting human embryo for research and therapeutic purposes.

2.2.1 'Spare' or 'Surplus' or 'Left-over' *in-vitro* fertilisation embryos

One of the most practical sources of deriving human embryos for hESC research is from embryos that have been created in fertility clinics. These are termed 'spare', 'surplus', 'left-

over' or 'supernatant' embryos and are obtained from the numerous embryos created during IVF which have not been implanted. The process used is as follows: a sperm and an oocyte are joined in a Petri dish and the resulting embryo is allowed to grow for several days. It is then either implanted into the woman's uterus or, if it is not to be used immediately, it is frozen and stored until the time when it is required (The New Atlantis 2012, p. 65 & Nuffield Council of Bioethics 2002, p. 9). Typical practice of IVF clinics is to create numerous embryos and freeze them until a successful implantation is achieved. Once that has happened, some of the remaining frozen embryos that are not needed by the couple will usually be allowed to either perish or be donated to research, with the couple's consent (Nuffield Council of Bioethics 2002, p. 9). As a result, there are usually thousands of 'spare' or 'surplus' embryos that remain at these IVF clinics which will end up being discarded if they are not donated to other infertile couples or for research purposes.

Many of these 'spare' embryos are acquired and used by scientists for hESC research as this is thought (by some) to be more ethically acceptable than other sources of embryos. This practice is often justified using a principle proposed by John Harris called the "Principle of Waste Avoidance"– which states that "other things being equal it must be better to make good use of something than to allow it to be wasted" (Devolder 2004, p. 367) – This is seen as an important principle in the defence of using 'spare' human embryos for research. On the basis of this principle, it would be morally justified that these 'spare' embryos are used for research work that is conducted to further improve patients' reproductive capacity or for research for non-reproductive purposes. This would only apply on condition that the research is performed only when the IVF patient(s) or couple(s) for whom the embryo was created for have given their consent for research. However, obtaining informed consent for hESC research and therapies from couples regarding their 'spare' embryos raises its own ethical

concerns, because of the importance of maintaining respect for the couple's autonomy. In particular, there are questions about what type of information needs to be conveyed to donor(s) of the embryo in order for their consent to truly count as being 'informed' (The New Atlantis 2012, p. 102 & Nuffield Council of Bioethics 2002, p. 10). In addition, other ethical concerns revolve around the motives of the physicians themselves who may be directly involved in hESC research. Given the vested interest in facilitating research there are worries that physicians or doctors might coerce their patients to make a decision to donate and/ or that they might create super-numerous 'spare' embryos deliberately in order to have some left-over for research later (Outka 2002, p. 180).

"Many of those who argue in favour of using 'spare' embryos from IVF clinics as a source for human embryos in hESC research base their position on certain principles" (Devolder 2004, p. 366). The first principle Devolder mentions is the principle of "Freedom of Research and Progress". According to this principle, restraint on scientific research is inherently offensive and generally unjustifiable. This is clearly the scientists' view as some believe that opposing this research will hinder scientific and clinical progress. The second principle he mentions is the principle of "Beneficence and Non-maleficence". According to this principle, we have an obligation to benefit people if we can and it is wrong to harm them. By not allowing hESC research from these 'spare' embryos (embryos that would be discarded anyway) it seems that we would be guilty of harming people by denying them the potential clinical benefits from this research (even if it is still just theoretical) and this will be unjust to humanity. Therefore it is a moral obligation to make use of these 'spare' embryos for hESC research for the 'good' of human society. He also cites the principle of "Proportionality". This principle of Proportionality states that "research has to serve an important purpose, such as a major health interest" (Devolder 2004, p. 366). Therefore, on the basis of this principle

human embryos ought only to be used for research for major health interest or medical crises or in urgent medical health issues and nothing else. This principle is tied together with the principle of beneficence and non-maleficence. However, the problem with this principle is being able to define what will count as a major health interest and who would be responsible in determining this. How will major health interest be assessed? The last principle that Devolder (2004, p. 366) mentions is the principle of "Subsidiarity" which entails that derivation of hESC from 'spare' embryos is only ethically justifiable if there is no other suitable and less controversial alternative means of obtaining stem cells for the purpose of research. Devolder (2004, p. 366) further explains what he means by this principle arguing that where there is another stem cell technology (example, Adult Stem Cell or Induce Pluripotent Stem Cell) which is less controversial and may in certain research be used for obtaining the same results or research purpose (whether scientifically or clinically), that this other alternative stem cell should be used rather than making use of 'spare' embryos.

However, I disagree with how the principle of Subsidiarity is used concerning the regulation of stem cell technologies and believe that 'spare' embryos should be used without considering other stem cell alternatives. The decision for using human embryo should not be based on their moral status only but also on scientific and clinical potential and how it will benefit society in comparison to the other alternatives stem cell technologies. For this principle to work there is a need to argue and prove that these other alternative stem cell technologies have a 'lesser' moral status. Additionally, they must show to have better technical and manufacturing capacity, clinical benefits and lesser ethical issues; ethical issues that are not related to their moral status. However, as it stands and what Devolder (2004) shows in his paper is that this principle is not being applied appropriately. In chapter 3 I

analyse these ‘less’ contentious alternative stem cells in order to make the principle of Subsidiarity effective.

Generally, ‘spare’ embryos are regarded as an ethically acceptable source for human embryonic stem cell research and therapy. Most people report in favour of this procedure (Devolder 2004, p. 366 & Devolder 2005, p. 171) and regard it as being less morally concerning than its counterparts (still to be discussed) which are viewed as deliberately ‘killing’ human embryos for research. What is vital is that informed consent is obtained from donors and proper procedures are followed in obtaining this consent from the couple whose embryo is of interest. Also, rather than discarding these embryos and wasting them without any beneficial use, it is better to use these embryos for research that may bring about health benefits, thereby increasing scientific knowledge and making some improvements in certain clinical therapies.

2.2.2 Embryos created specifically for hESC research

The first kind of embryos created specifically for hESC research and therapy I will discuss are ‘fresh embryos’ obtained from IVF. This occurs when hESC researchers require the acquisition of fresh (that is non-preserved, frozen or stored) embryos (Dicken & Cook 2007, p. 69), which may be sought for various reasons on the part of the researcher, for example, where the researcher requires specific tissue samples for specific genetic disorders or diseases. Additionally, cryopreservation has been reported to damage a certain percentage of embryos which are therefore deemed to be deficient, non-viable and of sub-optimum quality

(Hug 2008, p. 265). A report by Hug (2008, p. 265), has also shown that there is about a 5 % - 50 % successful derivation of hESC lines per embryo which may not be enough for research and therapies and thus, 'fresh embryo' as well as other created human embryos for this research may be required. Moreover, the results of poor quality embryos left which is often used from these 'spare' embryos for the derivation and culturing of stem cell lines compromises the genetic stability of these lines, and this is another reason for the requirement of 'fresh embryo' and other created embryos for hESC research.

'Fresh embryos' are typically obtained from couples who have fertility problems and want to have a baby, and are already part of an assisted reproduction programme. Such couples are asked to donate their 'fresh embryos' for hESC research before any successful implantation has even been achieved. This request for 'fresh embryos' following their transfer and *in vitro* creation a few days earlier may place medically dependent, exploitable patients in a position of having to make rushed decisions about donation without being properly able to absorb what is usually unfamiliar information (Dicken & Cook 2007, p. 69). I will describe the various ethical issues relating to 'fresh embryo' with those relating to other created human embryo sources for this research as they are similar.

Another equally important and probably much more ethically controversial source of harvesting human embryos for research and therapies is that which involves the creation of embryos specifically for hESC research. This is different from the above source ('fresh embryo') as it requires sperm and/ or oocyte donation only and not just the participation of infertile couples undergoing treatment for reproductive purposes. Any individual who is capable may be asked to donate either an oocyte or sperm. Scientific reasons for creating

embryos specifically for hESC research are the same as those given for obtaining and using 'fresh embryos'. Therefore, the use of embryos created solely for hESC research would be advantageous and also limit the number of 'fresh embryos' that may be needed for specific research and therapeutic purposes. However, there is another view which holds that both procedures used for the creation of human embryos for hESC research and therapy are immoral and ethically unacceptable and should be prohibited (Hug 2008, p. 265). The first procedure involves embryos that are specifically created in the same way as those embryos created in IVF clinics for reproductive programs (Brock 2006, p. 37), except that these embryos are not intended to be implanted into any women's uterus and are solely created for research purposes (as illustrated in Figure 2.1) and the second procedure involves embryos created by means of Somatic Cell Nuclear Transfer (SCNT) technique.

An ethical issue regarding the process of creating embryos solely for research and therapeutic purpose is that the embryo is mainly created for the purposes of benefiting others and with the intent of being destroyed for research in order for that benefit to be obtained (Brock 2006, p. 37 & Nuffield Council on Bioethics 2002, p. 12). This procedure has sparked concerns relating to the moral status of the embryo, with many who oppose this method arguing that this procedure instrumentalises human embryos as they are solely created to be deliberately 'killed' for research and are therefore used as a *mere* means to an end (Brock 2006, p. 37 & Devolder 2004, p. 367). The embryo is therefore not accorded the respect that is 'owed' to it since it is seen and viewed as being a 'potential human being.' Furthermore, Devolder (2004, p. 367) mentions that those who are against "…the creation of human embryo for research embryo view the embryo as not being treated with appropriate respect such a form of human life is entitled to, because it is used as merely a means to an end…" this view being based on

an…"underlying idea that applying the principle of respect for human beings prevents the instrumentilisation of embryos, which is an act that violates human dignity".

However a strong counter-argument is one that is grounded in an obvious inconsistency in the position of those who accept the use of 'spare' embryos for research (believing that it is permissible to create 'spare' embryos for research through IVF procedures to help couples have children - even though these 'spare' embryos may not be necessary) , but it is immoral to do the same thing in order to save lives by deliberately creating embryos for the same research (Devolder 2004, p. 367 & Green 2002, p. 603). Green (2002, p. 603) correctly points out that "embryos are the same no matter what the source or procedure used for their creation and their moral status should not depend on their progenitor's intentions". I do agree with this author in his reasoning and statement, as I do not see how the procedures or sources of the embryo actually influence the moral status of the embryo. At the end of the day an embryo is an embryo - whether it was created with the intention of being implanted or for research purposes only it is still an embryo. There are no plausible grounds for thinking that the intentions of the progenitor affect the moral status of the embryo. What remains is that an embryo is still an embryo no matter how it was created and for whatever purpose (reproductive or for research) it was created and those who regard embryos as having 'sanctity' of life and/ or having the right to life should award every embryo with the same moral status. Additionally, if the creation of 'spare' embryos from IVF is not questioned even though these 'spare' embryos may be created unnecessarily or with the same intention to use them for research later on, it makes no sense to question the creation of embryos specifically for research only. It is illogical that excess embryos for reproductive purposes are allowed while creation of embryos for research is not, when all these procedures, no matter for what purpose they will be used for (reproductive or for research), do not affect the moral status of

the embryo. Therefore, the same ethical principles should apply in order to justify the deliberate creation of an embryo for hESC research and therapy as with the use of 'spare' IVF embryo.

The second procedure used for creation of embryos for hESC research and therapy involves SCNT. SCNT is a kind of 'cloning' or a rather more appropriate term for it would be 'therapeutic cloning' or 'research cloning'. In the SCNT procedure (Figure 2.2) "an enucleated oocyte (an egg whose nucleus has been removed) is fused with the nucleus of a somatic cell (a cell containing the full complement of genetic material, unlike a gamete cell such as a sperm or oocyte which contains only half)", (The New Atlantis 2012, p. 65). This can then be induced to act as if it were a fertilised oocyte, dividing and developing into an embryo that can be implanted into a woman's uterus. This is known as reproductive cloning, a procedure that is different to SCNT based on the intentions of implanting the 'clone' for reproductive purpose and has given rise to many ethical controversies in turn, whereas, with SCNT the embryo will be used for either research or therapeutic purpose and will not be implanted for reproductive purposes. In turn, reproductive cloning is legally prohibited nationally and internationally and therefore this procedure's ethical issues should not be addressed under SCNT, even though SCNT was first performed in the creation of Dolly the sheep (Corrigan *et al* 2006, p. 1 & The New Atlantis 2012, p. 65) as a form of reproductive cloning. However, within hESC research and therapy this procedure is solely for research or therapeutic purposes and not reproductive purposes, to lower the risk of serious immune or graft rejection by the recipient when applied for therapeutic purposes as the somatic genetic marker will be the same as that of the donor-recipient person. For this reason SCNT procedure is beneficial for therapeutic purposes and can be used for research purposes for

understanding and improvement or graft rejection and lower the risk of immune when used for hESC.

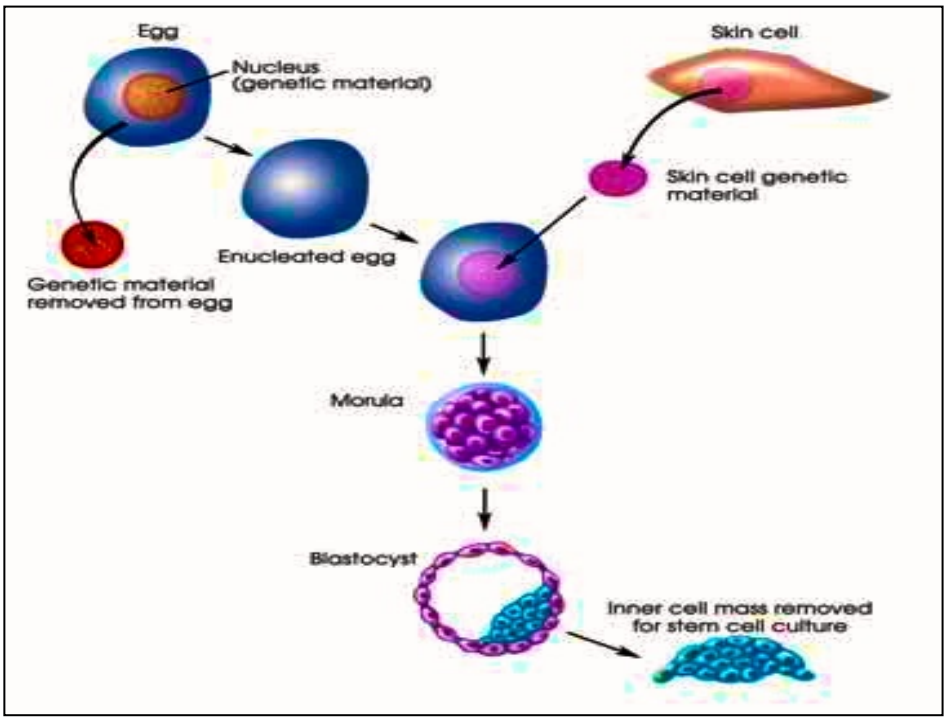


Figure 2.2 Somatic Cell Nuclear Transfer procedure – from the nucleated egg of a donor the nucleus is removed resulting in enucleated egg. A somatic material (from skin for instance) of a recipient's genetic material placed in the enucleated egg, harvested. From the Morula step the process will be the same as that of figure 2.1 (The National Academies 2005, p. 6) (Permission to use the figure has been obtained from the editor).

There have been many controversies regarding SCNT because the procedure has been likened to and confused with reproductive cloning, which has been scientifically problematic. For example, Dolly the Sheep later suffered from numerous disorders and diseases and it was found that the 'clone' was not identical to the parent, because of the mitochondrial

Deoxyribonucleic Acid (DNA) of the oocyte used in the SCNT. SCNT must be differentiated from embryo splitting (which would create an identical clone, unlike SCNT or reproductive cloning). Whereas with embryo splitting "clones could be created by splitting an embryo at early stages of cell division; by inserting an embryonic stem cell nucleus into the cytoplasm of an egg or by the stimulation of an egg cell such that they become embryos without being fertilized by sperm (process known as parthenogenesis)", (Ankeny 2008, p. 534). Therefore, the argument that SCNT for research and therapy will eventually lead to perfecting and creating clones is misleading and this is probably due to the use of the term "clone" in "therapeutic cloning". It is claimed that SCNT could pave the way for another unacceptable use, which is reproductive cloning, and that the risk may be considered sufficiently great to prohibit therapeutic cloning despite the potential clinical benefits, because of the possibility that embryos created for therapeutic cloning could be diverted to reproductive cloning (Green 2002, p. 604 & Hansen 2002, p. 86). Based on the above, it is clear that there is a distinct difference between SCNT for therapeutic cloning and for reproductive cloning, moreover that only embryo splitting can produce identical clones. Furthermore, the chances of diverting embryos created for therapeutic cloning to produce 'clones' are slim as such acts are against national and international laws and deemed offensive to humanity.

Therapeutic cloning (from SCNT) used for hESC research and therapy however raises a number of other ethical issues, apart from the same ethical concerns as those pertaining to the creation of embryos solely for research and therapeutic purposes. Additional issues may be related to the commodification of embryos, as well as the use of 'hybrid' embryos - embryos created by infusing an animal rather than a human oocyte and a somatic nucleus from a human donor, which I will not be addressing based on the scope of my study. Reproductive cloning and therapeutic or research cloning using SCNT should be well defined in order to

ensure clarity regarding the terminology used and avoid misunderstanding, as these words raise fears that halt hESC research through the SCNT technique.

2.2.3 Aborted fetus or cadaveric fetal tissue

Fetal tissue after an abortion is another source of pluripotent stem cells providing stem cells which have been proven to be similar to embryonic stem cells (deWert & Mummery 2003, p. 672). While this may be academically reported to be one of the sources for hESC research however I will not further address this section as it has been well debated[4].

2.2.4 Embryonic Stem Cell (ESC) lines without embryo destruction

There are a number of theoretically reported procedures and methods that can be used to obtain hESC lines for research and therapies without the destruction of the embryo which may 'resolve' the ethical issues regarding hESCs and thus provide the progress needed for this research to move ahead. However, these procedures are, as yet, theoretical and those that have been tried and tested using mice experiments have proven to be problematic and are not viable at the moment. These procedures include: Altered Nuclear Transfer (ANT), Pre-implantation Genetic Diagnosis (PGD), Organismically dead embryo and Embryo Stem Cell Fusion. These techniques have not proven to be effective, but in the future ethical concerns

[4] Because of the scope of the study it was decided that this section should not be included as it has already been well debated, even though aborted fetus are also sources of human embryonic stem cells.

related to these procedures may need to be addressed, however in the meantime I will not discuss them any further.

All these different sources for obtaining hESC lines for research and therapies that have been proposed entail ethical issues and concerns regarding the moral status of the embryo. Other concerns that are also of importance are those regarding informed consent, exploitation of women required to donate oocytes as well as the commodification of oocyte embryos. While some people still oppose the destruction of the embryo for hESC research, which has halted research progress and 'discoveries' of potential clinical benefits, an equally important ethical question is one concerning the moral obligation to those who are currently living and suffering from sickness and disease and may benefit from this research and its therapies in the future. In the next section I will discuss and analyse the debates regarding the moral status of the embryo by concentrating on the normative arguments and moral principles that have been used in trying to articulate a theoretically sound basis for the moral status of the embryo. Before I do that let me explain what is meant by the notion of 'moral statuses'. "To have a moral status is to be morally considerable or to have a moral standing. It is an entity towards which moral agents have, or can have, moral obligations. If an entity has moral status, then we may not treat it just any way we please*",* (Warren 1997, p. 3). Another definition in the Jaworska (2013, p. 1) says that "an entity has moral status if and only if it or its interest morally matter to some degree for the entity's own sake such that it can be wronged". Thus, the moral status is determined by certain criteria or values that an entity has such as intrinsic value and non-instrumental value. These values are important in determining the moral status of the embryo and whether or not it is able to have moral standing. If it is shown to either have or to exhibit both moral standing will it be wrong to instrumentalise the human embryo for hESC research and therapy, since we may have a moral obligation towards it to do what is

right for its interest sake? To answer this let us now look at the normative discussion regarding the moral status of the human embryo in the context of research and therapeutic purposes.

2.3 MORAL STATUS OF THE EMBRYO

Ethical discussions about hESCs are frequently framed in terms of the embryo's moral status bringing in the important question of when human life really begins. That question may be answered differently depending on one's view on this subject. McLaren (2007, p. 23) says that "to a biologist that question is not a meaningful question since life is a continuum", with the biologist's view regarding the beginning of life starting from one-cell stage onwards or from fertilisation onwards. Both deWert & Mummery (2003, p. 674) & McLaren (2007, p. 23) state that (based on the one-cell stage point of view) the moral status of the human embryo is best understood as developmental, with the moral status of the embryo increasing as it develops into a fetus then into a baby. The moral status of the clump of cells from the inner ICM cannot be viewed as equivalent to that of the fetus and/ or the human baby. A hypothetical example given to illustrate this notion is that one must imagine that a fire breaks in a laboratory in which there is a living human baby as well as ICM cells stored in the freezer. Assuming there was only enough time to rescue either the baby or the cells what would you choose to save? Most people would choose to save the baby. This example is an interesting insight on how we intuitively accord a higher moral status to a baby than a fetus.

Therefore, the moral status of the embryo, based on this continuum principle or the biologist principle, implies that it may not be morally wrong to destroy or harvest an embryo for research and therapy. However, a distinction is often made by those who regard embryos as being potential human beings and therefore, regard an embryo as having the same rights as those awarded to a 'full' human being. Such people will argue that the embryo must be given the same respect and protection as a 'fully' developed human being. Usually this is a religious argument based on some notion of the 'sanctity of life' with every embryo having the right to life. Such arguments have been there since the abortion debates, followed by the IVF debate when they, too, were still in their infancy (Holm 2002, p. 497) with such people believing that the moral status of the embryo is the same as that of an adult human being from fertilisation. On the contrary, there are others who still believe that the embryo is a potential human being and should be awarded some respect and protection, though less than that of a full human being (Dickens & Cook 2007, p. 68). These people accord the human embryo with some moral status from its primitive stage (approximately 14 days, based on the development of the nervous system), that is based on scientific evidence that after this stage, if the embryo does survive, it will develop into a single individual (Ethics Committee Report 2009, p. 668) and to them this primitive stage marks the beginning of a human life.

There are those who do not take either the side of the absolute view or the primitive stage view of the embryo and they hold the view that the embryo has a moral status that is distinct from a human child or adult. However, because the embryo has the potential to develop into a person (if it is provided with the necessary environmental conditions, such as being implanted in a uterus), even though it does not possess the same moral status as a person it must still be granted some special respect. But not as much as that accorded to a person no matter what the source or the procedure used. Respect should be accorded to embryos used in hESC research

and therapy, respectively. There are arguments regarding the moral status of the human embryo and its instrumentalisation in hESC research and therapy which are specifically based on normative theories such as deontology and consequentialism. I will discuss those arguments below.

2.4 NORMATIVE ARGUMENTS REGARDING THE MORAL STATUS OF THE HUMAN EMBRYO IN HESC RESEARCH AND THERAPIES

2.4.1 Deontological arguments regarding the moral status of the human embryo

Debates on the moral status of the embryo have been well addressed. Now, I will begin with the arguments of those who take on the right to life position and argue based on the claim that the embryo has the potential to become a person. On this view, the fact that an embryo is not conscious and cannot feel pain; in other words an embryo has no interest of its own (what I mean by this is that if something has no consciousness it does not have interest or awareness of what may be right or wrong for it in order to make a decision for itself) and is not sentient, does not matter. Nor does it matter that it may never acquire those characteristics or even be placed in a suitable environment such as a uterus for a chance to develop into a 'full' human being. Yet some argue and insist that it must still be treated as such because it is living, has a unique human DNA and if implanted in a woman's uterus it might develop those characteristics (Robertson 2010, p. 192). There are some flaws in this type of thinking because micro-organisms are living, albeit they don't possess human DNA but they are living

and possibly 'feel' pain too (when studying stress behaviours of micro-organism in different environments[5]) and yet the same people kill them every day by simple sanitation and so forth. Should these micro-organisms be left because they are living and showing some life, even if they may cause some detrimental illnesses? Additionally, higher primates (such as baboons) have somewhat similar DNA to that of the *Homo sapiens*. However, we do not give them the same rights akin to the human race and nor do we treat them in a similar fashion even though these primates are more conscious and sentient than an embryo. "The notion on the human embryo being looked at and perceived as a 'full' human being from the moment of fertilisation by some people somehow guarantees the embryo the right to life according to their point of view and arguments" (Oduncu 2003, p. 11). Hence, with this view being mostly based on religious beliefs or a certain kind of deontological perspective that are grounded in the ideas of Immanuel Kant (of course not all deontologist as I will explain later in the chapter holds this view) and they use Kant's ideas in order to argue against the use of human embryo in research.

According to Kant's fundamental moral principles, what makes an act right is simply that the end never justifies the means and one must do one's duty regardless of the consequences (Nortjè 2007, p. 78), Furthermore, "people have an intrinsic worth i.e. dignity" and because of this dignity it therefore "requires us to treat them always as an end and never as a means only" (Rachel & Rachel 2012, p. 137- 138). This means that if a human embryo is found to possess intrinsic values (such as dignity, and being an autonomous and rational being) the

[5] Some references include: Mile *et al* 2005 "Compared tolerance to osmotic stress in various microorganism: towards a survival prediction test, Zavizion *et al* 2010 "Rapid Microbiological Testing: Monitoring the Development of Bacterial Stress" and Article posted on the 8th of May 2015 titled "Sterility Testing: the detection of stressed microorganism in 7 days' from www.rapidmicrobio.com/blog/sterility-testing-the-detection-of-stressed-microorganisms-in-7-days.

destruction and harvesting of any type and/ or source for hESC research and therapy is unethical as they either use an embryo as an instrument or an object – basically as a *mere* means to an end; as this would mean that we have a moral duty towards the embryo regardless of the consequences from this research. Oduncu (2003, p. 11) says this notion therefore "forbids and even condemns instrumentilisation and reduction of a human being to a *mere* means and an object". Moreover, all the potential therapeutic benefits that hESC research may potentially bring in the future should not be used as a pre-determining standard for us to accept and turn a blind eye on the use of the human embryo. We are obliged to do our duty regardless of all the consequences and benefits that may result from this research and our duty is to protect the embryo as this is a moral 'right' and 'good' act.

On this view, because an embryo has a 'potential' life if placed in a uterus and allowed to develop, embryos should not be treated as *mere* means as human being are ends in themselves. Therefore, regardless of the sources and procedures that are being used to harvest an embryos for hESC research it is unethical and the benefits from this research can never justify the use of human embryos. According to some people (those who regard the potentiality of the embryo as granting it a similar or the same moral status as a 'fully develop' human being) human embryos hold the same moral status as a 'full' human being and therefore should not be 'killed' (as they see destruction of these embryos as killing) regardless of the extent of the benefits towards humanity as a whole (Daley 2001, p. 2). The same people normally use the notions of 'respect of life' and / or 'sanctity of life' approach for their arguments and this is often understood as one who values life more than other values in order to make their argument against the harvesting of human embryos for research and therapeutic purposes. To them life (as one being given the opportunity to be born) is the highest value and is a sacred and an inviolable value. They further believe that it is

impossible to give an embryo some form of respect and dignity and still be able to kill it in the process. They draw their theory on the language of means and ends to evaluate the case of 'killing and saving' for a greater end, for which the benefit outweighs the risk.

However, Kant's moral principle explains that an action is moral only if it manifests respect for a person/human being, i.e. moral standing is assigned to rational beings and not irrational entities (such as embryos). As a result, rationality is the characteristic that gives the entity rights to life and respect as it characterises the attributes needed to be a potential human being. Therefore, since an embryo lacks the capacity for rationality it can be used for research and therapeutic purposes. Respecting an embryo is not dependent on its value for us or its usefulness to us, since respect entails valuing something in itself, beyond its mere usefulness.

Kant's formulation of respect of a person does not prohibit a person from being used as a means to others' ends, but from being used *merely* as means (Nortjè 2007, p. 79). To treat someone or something as an end and not merely as a means is to respect their dignity, and "this dignity is conferred upon person by virtue of their autonomy" (Nortjè 2007, p. 79). This means that we would have to treat this person in the right way by ensuring that we promote their welfare, respect their rights and we do not harm them (Rachels & Rachels 2012, p. 138). To further elaborate on this notion I would like to give an example used in cord blood banking, where child x's cord blood will be stored for future use of his/her other siblings, making child x a means to the end for his/her sibling(s). However, both children will still be loved by their parents in the same way. Will this be making child x a *mere* means or make child x a means to an end? Certainly not a *mere* means, since child x will be treated with respect (by respecting his or her rights and dignity) but child x would be a means to an end

and in this case an end that will benefit his/her siblings and save their lives. Against that an embryo is seen as being used in the same way as child x, furthermore an embryo does not have rationality and lacks interest of its own therefore, it cannot be given the moral status that is equal to that of a 'full' human being (Nortjè 2007, p. 79) but may be accorded moral value. (By moral value I mean the respect or moral respect it will be given as an entity in research and therapies as well as one which can become a 'full' human being if allowed and implanted in a woman's uterus). Therefore, human embryos can be used for hESC research and therapy as means to an end but not as *mere* means since there is a much 'higher' moral obligation to those who are sick and in pain and who may benefit from this research, those being the rational beings.

2.4.2 Utilitarian approach to the moral status of the human embryo

Many of the people that argue in favour and support of hESC research and therapy rely on utilitarian thinking. Utilitarianism is a moral theory that proposes that "the morality of an action is to be determined through an assessment of its consequences. This theory or principle, i.e. the *Greatest Happiness Principle"*, (Nortjè 2007, p. 80), Rachels & Rachels (2012, p. 110) explain that it "holds that the actions are right if they promote happiness in greater proportion than unhappiness, and wrong if they tend to produce the reverse of happiness". Therefore, utilitarian's who support hESC research take on this view and argue that the 'sacrifice' of embryos is for the good of human society as it will bring about clinical benefits and alleviate suffering. They see the embryo as too rudimentary in development to have interest or rights and thus it should not be protected at the cost of legitimate and important scientific research (Robertson 2010, p. 192) and therapeutic benefit.

Utilitarianism, can therefore be summed up in three propositions: *"(a)* the morality of an action depends solely on the consequences of the action; nothing else matters. (b) An action's consequences matter only insofar as they involve the greater or lesser happiness of individuals. (c) In the assessment of consequences, each individual's happiness gets 'equal consideration. This means that equal amounts of happiness always count equally; nobody's well-being matters more just because he is let's say rich, or powerful, or handsome. Regarding morality, every one counts the same. According to Classical Utilitarianism, an action is right if it produces the greatest overall balance of happiness over unhappiness" (Rachel & Rachel 2012, p. 110). Nortjè (2007, p. 81) further explains this notion and says that "it means that something is morally right and permissible if the good is maximized by comparing all options of action and then choosing the maximum amount of aggregated happiness". Moreover, he further mentions that "this too should be applied to the morality of stem cell research and therapy". Thus, it is not difficult to see why most utilitarian's are in favour of hESC research despite the contentious issues regarding the destruction of the human embryo as they may see this research as a vehicle that may offer clinical benefits. Additionally, hESC research may also contribute to basic scientific knowledge that is needed for improvement of other therapies and so forth.

Those who argue in support of hESC research base their thinking on this and view these 'possible' benefits from hESC as outweighing the loss or destruction of the human embryo (Ethics of Stem Cell Research 2013, p. 1). They further reject the notion that an embryo is a human being and should be accorded the same respect and moral status as a human being. They say that if the embryo is used for research which may eventually ease and alleviate human suffering this is regarded as an ethical 'good'. Destruction of the human embryo for hESC research is permissible as we would be doing well. However, sometimes "taking the

life of a human 'being' is not fundamentally wrong, but saving or enhancing the life of a living and breathing human being is preferred (Nortjè 2007, p. 82). The same author also mentions that "Singer takes this idea a step further by adding that the fact that a being is a human being, in a sense of a member of the species of *homo sapiens*, is not relevant to the wrongness of killing it; it is, rather the question of whether the entity killed is a person or not"…based on the criteria for personhood…"with personhood characterised by traits such as rationality, autonomy and self-consciousness and Brody summarises the position as follows… *killing is wrong only when it leads to bad consequences*". Therefore, unless an embryo is regarded as a human being, i.e. *homo sapiens*, as well as having the traits considered to determine personhood, then destruction of the embryo for research and therapy will be considered as killing or taking a life of a human being. In determining the consequences of stem cell research, one should not take into account what the embryo's life would have been like had it been allowed (through the right conditions and environment) to live, but rather consider the satisfaction of developing healthcare treatments that would benefit rational beings which would outweigh the reason for not using the embryo for hESC research and therapy (Nortjè 2007, p. 82).

However, those who oppose this view argue that the utilitarian's approach is not compatible with the idea of human rights and that it seems to violate the embryo's (only if the embryo is assumed to be a human being) dignity by allowing creation and destruction of the human embryo for potential health benefits. Furthermore, they argue that the embryo should (even when used in research for health benefit) be given some moral status, albeit not the same as a 'fully developed' human being, since the embryo has the potential to be a human being. They base their argument on the potentiality of the embryo and the intrinsic and extrinsic values that it possesses in order to deserve some respect.

There is no common ground that has been reached with both deontology and utilitarian arguments. Therefore, in the next section I will discuss previous arguments that are based on the personhood of the human embryo.

2.5 PERSONHOOD ARGUMENTS CONCERNING THE MORAL STATUS OF THE HUMAN EMBRYO

Potentiality arguments have been the central idea in discussing the moral status of the human embryo with the question to whether scientist should do anything to promote or retard this potentiality or not (Solomon, Sandra & Brockman-Lee 2008, p. 6). The potentiality of the embryo is based on the features of human embryos that members of other species do not share with the human beings; features such as being "the sort of complex, intelligent, self-conscious, multifaceted creatures which is typical of members of the human species" as Devolder & Harris (2007, p. 156) stipulate. Characteristics typically appealed to in order to define this potentiality or rather the personhood of the embryo depend on internal and external factors also known as intrinsic and symbolic values. Since personhood is distinguished by exhibiting both intrinsic and symbolic values, both these values will need to be taken into consideration regarding the determination of the personhood or potentiality of an embryo to being a person. Intrinsic value is defined or explained as 'being values in themselves' (inherent values such as dignity) and thus cannot always be measured scientifically, while symbolic value is explained as being the embryos' genetic or DNA

constitution, its developmental potential to become a human being, i.e. 'symbol of future life' (Devolder 2004, p. 367 & Dondorp & de Wert 2005, p. 10).

Based on both intrinsic and symbolic values, the use of human embryos for hESC research and therapy can therefore be viewed as violating the embryo's dignity, since, human embryo is closely related to human beings through its genetic marker and this being one of the initial forms in which societal views regards the embryo as an initial life (Dondorp & de Wert 2005, p. 10). Additionally, because some argue that the creation and use of a human embryo for research and therapy may be due to the moral agents' intentions (to create and destroy the embryo for hESC research and therapy) and this has an impact on certain practices in our respect for human life (Devolder 2004, p 36). Thus, making use of a human embryo be regarded as 'killing', when embryos are harvested using those techniques based on its symbolic values. However, neither of these values provide justifiable reasons for not using the human embryo for research or therapies and since baboons are also known to be closely related to human beings (genetic marker), does that mean we must grant them the same moral status as a person or does it make them moral agents based on their symbolic value? Or would it mean that any biological entity should have more than just the genetic makers that are related to those of human beings in order for that entity to be regarded as 'potential' human being or granted the same moral status as a 'full' human being? Applying symbolic value to determine the potentiality of human beings may be tricky. Firstly, we would have to determine which symbolic values can be used or are important enough to determine the personhood of an entity. Secondly, we need to have a certain genetic percentage that would be used in order to determine what is closely related to a human being. Lastly, how many of these symbolic values should be used as determining factors seeing that symbolic value can be determined by a number of factors. What I am trying to say is that there are no set rules to

determine the appropriate symbolic values to use in order to determine if an embryo has the same moral status as a 'full' human being. There should be some guidance as to how these symbolic values can be applied or not in order to determine the moral status of the human embryo or any other biological entity. Using the symbolic value to argue for the moral status of the human embryo may not be the most appropriate way as there are no actual rules or guidelines on how and what to use exactly.

However, an embryo can be tested for the presence or absence of the above values (both the intrinsic and symbolic value) by using criteria to distinguish and determine whether the embryo possesses personhood or is a potential person. Personhood which determines the qualities or properties of being a 'person' or 'human being' are inherent and fixed (Dickens & Cook 2007, p. 68). Potentiality argument based on sentience is usually used in hESC research in order to give the embryo some moral status, but lower than that of the 'fully developed' human being. However, because an embryo lacks both interest in itself (and the ability to make autonomous decisions) and also lacks the central nervous system (at the development stage) which is required to have or feel any pain (be sentient), the embryo can be used for research and this will not be harming the embryo. Furthermore, "minority claims that the 'difference between biological tissue and a human life worthy of respect and rights' lies in the 'special properties' of having the 'capacity for suffering or conscious experience in any form'. That is, being sentient is necessary to possess any moral status*"* (Nelson & Meyer 2005, p. 38). Therefore, as harm can only occur where pain is caused, it is necessary for a being to be able to feel pain and to recognize that it is in pain for it to be harmed. Such capacities are impossible to an embryo. Furthermore it cannot make autonomous decisions as it lacks autonomy.

There is a middle ground to this approach which is usually taken by those who see the potentiality of the embryo as a matter of degree. Since an embryo is a potential person it should be awarded some form of respect and dignity, with this being regarded as moral value. These people acknowledge the link between potentiality (to be a 'full' human being) and inherent probability (or attributes to be a 'full' human being). Moreover, they claim that the more probable it is for an embryo to develop and become a 'full' person the greater the protection it should be given. They are therefore of an opinion that we ought to afford the embryo some respect and dignity (Hug 2008, p. 109), but not full moral status, that is the same moral status as with any entity used for research, i.e. more precisely a moral value (this being the respect and dignity given to any entity used for research) and not a moral status. With this moral value which can be accorded to the embryo increasing gradually during the course of the embryo's developmental stages, and having the opinion that these varieties of criteria interact and work together leads to a mounting sense of concern and ultimately to judgements of worthiness of the embryo's protection (Devolder 2005, p. 178-179). Therefore depending on when the embryo is used (i.e. 14 days) for research, moral value can be given to it as it has not devloped to a point where it may be given moral status. Thus, the more developed the embryo is the more moral values, probably leading to moral status, will be awarded to it. Devolder (2005, p. 179) is also of the opinion that "in determining the status of an embryo or fetus at a particular stage of development, we have to look at all these qualities and their interrelationships, therefore, the greater the number of criteria an embryo or fetus meets the closer it comes to being fully protected".

This view has a certain advantage as one may see that a zygote or ICM cells and/ or a six months fetus are different and most people will regard a six months' fetus as more developed than the other two, thus according the fetus with more moral protection than the other two.

Devolder (2005, p. 182) claims that "there are forms of respect and deference which are less absolute and which can have graduations. Therefore, the respect one may have for an entity does not exclude it (from being used as a resource for a goal which is believed to be important) provided that a meaningful argument is presented". Against this, if a meaningful argument is presented for the use of the human embryo for research and therapy it may be justified and used as long as this will be for an important goal (however that important goal may be defined). However, prohibition of using an entity based on people's respect for it is not a valid reason for not using that entity for research and therapeutic purposes.

Furthermore, "giving some moral status to an embryo does not automatically rule out embryonic stem cell research since it can be argued that the likely benefits in terms of reduction of human suffering and death in many cases outweigh the sacrifice of a (small?) number of human embryos" (Holm 2002, p. 498). In addition, Kant only assigned moral standing to rational beings and not non-rational beings. Therefore, on Kant's basic thinking, an embryo cannot be assigned any moral status as it is not a rational being, with rationality being one of the characteristics for personhood as already mentioned (Nortjè 2007, p. 80). Thus, "utilitarian's state that taking a life of a 'human being' is not wrong, but saving or enhancing a life is preferable" (Nortjè 2007, p. 82). Against that the characteristic of personhood include but are not limited to a self- conscious, autonomous and sentient being, for which in any case an embryo does not possess.

All these arguments show that an embryo does not hold the same moral status as a 'full' human being as it is not a human being at that stage. However, as a result of its potentiality that if it were implanted in a uterus or placed in the right environmental conditions it would

have developed further into a full human being, it has a moral value. Therefore, moral value should be accorded to the embryo just like with any other entity used for research. Moreover, what most people seem to agree on is the meaning of the term 'potentiality,' that if something has a potential it does not mean that it is actual but can become actual. Examples used to illustrate the above are those given by Devolder & Harris (2007, p. 157) explaining that an acorn is not an oak tree and neither is an egg an omelette. Therefore, just because something has the potential to become something it does not mean that we must treat it always as if it had achieved that potential. Unless and until we (living and breathing human beings) achieve the possibility of immortality we are all potentially dead, but that does not mean that we must be treated as if we were dead already even while still alive and breathing (Devolder & Harris 2007, p. 157). Both these examples provide an illustration of the lack of logic behind the potentiality arguments.

Furthermore, if an embryo is awarded the same moral status as a 'full' human being thus, "even a human zygote, since it somehow also possesses the potential to become a human being and is therefore supposedly morally important in virtue of that potentiality, should be given the same moral status. What then of the potential to become a zygote? Something has a potential to become a zygote and whatever has the potential to become the zygote has whatever potential the zygote has. It then follows that an unfertilized oocyte and sperm should also have the potential to become a fully functioning adult human…", these will all need the same moral status and respect awarded to an embryo. In addition, when looking at what Devolder & Harris (2007, p 157) state about potentiality, this may have implications for family planning procedures, including sterilisation, as these procedures may be regarded as 'killing' a potential human being. I agree with both these authors' arguments that just because something has a potential to be something, that something does not and should not be treated

as if it were that already. Since the human embryo has not been shown to exhibit the values and qualities that distinguish personhood, an embryo does not possess the same moral status as a person and can be used in hESC research and therapy.

I will now discuss whether or not hESC research is morally justified based on an African principle, i.e. Ubuntu, and will draw my conclusion not only based on existing normative arguments (as discussed above) in seeking to understanding the moral status of the human embryo. Thus, the above arguments for the instrumentalisation of the human embryo for hESC research and therapy showed that there is nothing morally wrong with using human embryo for research and therapy. Because those arguments were based on the Western notion and principles concerning the moral status of the human embryo, thus I wanted to analyse and discuss the same moral status of the human embryo for research and therapy based on the African perspective. Moreover, the laws, regulations and professional guidelines that I will be reviewing and analysing are South African based and it was only befitting that I use an African ethical principle to analyse the legal framework, apart from the fact that the moral status of the human embryo has not been addressed in an African perspective.

Furthermore, there are some distinct differences between the Western and African ways both morally and socio-culturally, so I want to try and unpack these similarity and differences and point of views based on an African perspective. This will bring understanding on how hESC research and therapy with inclusion to patents can be applied within an African contents in Africa for Africans. I will use the same 'trends' of arguments concerning personhood and/ or 'potentiality' of the human embryo as these arguments have been central to the debates about the moral status of the human embryo. Therefore, it will also be fair to discuss and analyse

the ‘potentiality’ of the embryo from an African perspective, using Ubuntu as a normative principle, and when personhood begins and how is it determined. This will give clarity on whether or not an embryo at the stage that it is used as a source for research and therapy is morally wrong or not and does it possess the same moral status as with a ‘full’ human being or not. Therefore, my analysis and argument will not only be based on the literature references concerning Ubuntu but I will also make use of my own opinion and judgement based on my own cultural background as a South African Nguni person.

2.6 UBUNTU: AFRICAN PHILOSOPHY

Ubuntu is generally held to be deeply rooted in African indigenous cultures. “Although there are many diverse African cultures, there are commonalities to be found among them, such as value systems, beliefs and practices” (Murove cites Munyaka & Motlhabi 2009, p. 63), which is why Gade (2012, p. 486) reports that “Ubuntu represents notions of universal human interdependence, solidarity and communalism that can be traced to small-scale communities in pre-colonial Africa, of which underlie virtually every indigenous African culture”, i.e. reflections of African traditionalism (Eklund 2008, p. 14). Hence, Eklund (2008, p. 14) cites Ramose (1999) stating that “Ubuntu according to him is the root of African moral philosophy that emerges from thoughts of the Bantu speaking people”. Although it is not certain about how far back Ubuntu dates, Ubuntu has been said to have been in Africa for as long as human existence in Africa, or, at least in Southern Africa, not as a philosophy, but as a way of life in the African community, particularly South Africa (Murove cites Munyaka & Motlhabi 2009,

p. 63). Thus it is transmitted and maintained in different forms and thoughts, from one generation to another in an African manner through oral genres, fables, proverbs, myths, riddles, stories, songs, customs and institution (Eklund 2008, p. 14).

The word Ubuntu can be found in almost all African languages, more so in South Africa, with the term being found in Nguni languages (example isiZulu). Similar meaning are found in isiSotho 'Botho'; in XiTshonga as 'Vumuthi'; TshiVenda as 'Uhuthu' (Murove cites Munyaka & Motlhabi 2009, p. 63), whereas in other African languages it is found as 'Bumutu' in Kisukiuma and Kihayi in Angola. 'Umunthu' in Malawi and 'Vimuntu' in shiTsonga and shiTswa in Mozambique (Hailey 2008, p. 3). Defining the term 'Ubuntu' is rather difficult, with Gade (2011, p. 307) in his paper encapsulating all these different definitions of 'Ubuntu'. According to Hailey (2008, p. 2) who cited Archbishop Desmond Tutu stating that "'Ubuntu' is very difficult to render or translate and define in Western language other than to say 'my humanity is caught up, is inextricably bound up, in what is yours". Ubuntu, in simpler terms can be defined as Humanness, Humanity or Human nature, these being the most acceptable terms and definitions used. Due to these challenges in defining Ubuntu with just one simple term, this implying that Ubuntu is more than just a manifestation of one individual act, it is rather the capacity to be able to express compassion, reciprocity, dignity, harmony (Nussbaun 2003, p. 21), being sensitive to the needs and wants of others, sharing, being sympathetic, caring, considerate, patient and being kind (Mkhize 2003, p. 6). When an individual is able to act and show these virtues and values within other members of the community they recognised as having or possessing Ubuntu. Moreover, "Ubuntu is a spiritual foundation, an inner state, an orientation and disposition towards good motives, that challenges and makes one perceive, feel and act in a humane way towards others, i.e a way of life" (Murove cites Munyaka & Motlhabi 2009, p. 65).

Ubuntu is considered to be the most important quality of umuntu (a human being or person) (Murove cites Munyaka & Motlhabi 2009, p. 65) and this quality includes warmth, empathy, understanding, communication, interaction, participation, shared world view, collective co-operation (Mkhize 2003, p. 6), respect of human beings, dignity and life, humility, solidarity, hospitality, interdependence and communalism (Hailey 2008, p. 5). It is truly being able to promote genuine harmony and continuity throughout the wider human system (Hailey 2008, p. 4). Ubuntu finds its meaning in the expression and proverb: 'umuntu ngumuntu ngabany' abantu', in isiNguni, where in isiSotho it would be 'Motho kemotho ka batho babang' both of which translate to 'a person is a person through other persons' (Murovi cites Munyaka & Motlhabi 2009, p. 65), or as some like to translate it: 'I am because we are' (Eklund 2008, p. 14). As an abstract concept, Ubuntu is made concrete by the values that I have mentioned as well as the components which can be identified from the proverb. Murove cites Munyaka & Motlhabi (2009, p. 65) that they place more emphasis on values such as respect for a person, the importance of community, being communal, personhood and morality, making Ubuntu a pivotal norm among African societies because of these mutual similarities amongst their shared valued systems (Eklund 2008, p. 15).

On the basis of Umuntu ngumuntu ngabany' abantu, there is no individual self or autonomy as such; not that an individual has no autonomy but rather with the self being found and embedded with others, meaning that you can only be seen or regarded as a 'full' human being or person within a community, members of the community awards you with Ubuntu based on how you relate and act towards them. Eklund (2008, p 15) cites Augustine Shuttle (2001, p. 12) who explains that "the above proverb (Umuntu ngumuntu ngabany' abantu) means that a person depends on personal relations with others to exercise, develop and fulfil those capacities that make one a person", which is in agreement with my own understanding of that

proverb. While at the beginning of one's life, one is only a potential person, as they grow and develop as a person in life within a community or in relations with others they become umuntu therefore seeing life as a continual process of becoming more of a person through interaction with others in the community. Therefore, that personhood comes as a gift from others, and makes you become umuntu onobuntu (a person with the set qualities or virtues that Ubuntu is identified with). Furthermore, in an African view and context, autonomy is only understood and practiced in relation to others (in the community), with self being rooted in the community, thus supporting the statement made by Archbishop Desmond Tutu that "my humanness is caught up, is inextricably bound up, in what is yours". Based on my own understanding this does not mean that one loses their self or autonomy, it just simply means that one gets to become 'more' of a human being when one interacts and becomes rooted within one's community. This view is also in agreement with what Chuwa (2014, p. 36) states in his work that "Ubuntu champions realistic ethical freedom". He further elaborate this by quoting Weil that "It is not true that freedom of one man is limited by that of other men". "Man is really free to the extent that his freedom is fully acknowledged and mirrored by the free consent of his fellow men finds confirmation and expansion of liberty. Man is free among equally free men". To illustrate this better, in 1994 when under the leadership of former President Nelson Mandela, Black South Africans did not receive their freedom at the expense of the minority White South Africans by trying to bring revenge. Instead peace was established in order for all South Africans, no matter what race, to be able to live together as a unified nation. This was because of the above notion that man is not free unless living with equally free men. To be free within a community every individual within the community must possess the same freedom. Therefore, within the context of Ubuntu, autonomy is understood in this manner and individuals are able to still "think and act independently as long as their actions do not harm others…from this perspective of Ubuntu there can be no

absolute individual right" (Chuwa 2014, p. 36). You are, however, still an individual with your unique qualities and interests for yourself but expressed through your community, in benefiting and adding value to your community as a whole. Because you have an understanding that what you do influences and affects your community either in a good or bad way and by being part of the community one learns the qualities of having Ubuntu and acting for the wellbeing and goodness of not only oneself, but also for their community. Ubuntu sees community rather than self-determination as the greatest essential aspect of personhood. People are distinctive beings, able to recognise and acknowledge each other through mutual encounters and cultural integration (Nussbaum 2004, p. 22). Communalism means that no one lives for him/herself, but rather, one's life is connected to one's community (family or village etc). Eklund (2008, p. 6-7) further elaborates on this notion of communalism that in an African context versus that of European, there are concerns about expressing Ubuntu in terms of collectivism because it does not acknowledge the individual and can therefore be easily used for purposes of oppression. However, Ubuntu means that collectiveness for the individual is not just being part of the community, but also viewed as a partial whole with reference to others. A good example to demonstrate this is an Akan proverb which says "The clan is like a cluster of trees which, when seen afar, appear huddled together but which would be seen to stand individually when closely approached" (Chuwa 2014, p. 35). This can be understood that "relationships in Ubuntu should not overshadow the importance of individual autonomy, as the analogy of the proverb implies that even though some branches of the tree may touch, or even interlock each tree stands individually and has its own identity" (Chuwa 2014, p. 35). In other words, the individual is not just part of the world but rather the individual is the world, meaning that the individual and the world co-exist together, that individuals make up the world. That the individual is not a means to the community, but they are the end to themselves and in that manner, every person is respected

as a person. Ubuntu does not promote that one should be used as a mere means or to oppress others.

The interconnectedness with others is the reason why an individual is able to not only want to better him/herself, but rather the entire community. They realise that when they become better, the entire community through them becomes better as well. This displays responsibility, respect for others, caring, aid-giving, solidarity and maintenance of harmony through what one has learnt and achieved. "What 'umuntu ngumuntu' implies is that each person has a self-defining value…this self-defining values means that an individual is viewed as his or her community and thus represents that community and is part of that community and it is easy for that particular individual to relate to his or her community because it is related to him or her as well… By adding 'ngabantu' implies that one as an individual cannot be taken out from its context, within the wholeness, as an autonomous being which in him/ herself requires respect", as Eklund (2008, p. 17) explains. Ubuntu is a community based mind set in which the welfare of the community is greater than the welfare of a single individual, placing an emphasis on the good of the community, especially during ethical decisions (Olinger, Britz & Oliver 2005, p. 3). Moreover, that "the community is more important than the individuals who make it and the needs of the community should therefore take precedent to individual needs" (Chuwa 2014, p. 34). On that background, Ubuntu can therefore be used to decide on ethical issues pertaining to science and technology in order to use these technologies and therapies developed for the good, wellbeing and welfare of the community. One such technology is the harvesting and culturing of human embryo for hESC research and therapy.

Next, I will analyse and discuss whether according to this philosophy and norm is it morally acceptable to use human embryos and if there is anything new that can be added to the previous debates (Western) regarding the moral status of the human embryo and issues concerning personhood of the human embryo. I will therefore analyse the personhood of human embryo, i.e. 'potentiality' of the human embryo, in order to determine the moral status of the embryo's as viewed in an African society.

2.7 UBUNTU AND PERSONHOOD: MORAL STATUS OF HUMAN EMBRYO

The arguments about the moral status of the human embryo mostly centre around the potential personhood of the embryo and if the embryo is found or shown to have this 'potentiality' then it will be ethically unacceptable to make use of the human embryo for hESC research and therapy. This is therefore based on determining whether or not an embryo has the characteristics of personhood at its primitive stages (since legally this is at the stage that human embryo can be used for research and therapy). Debates on the personhood of the embryo have only been based on Western views and norms regarding what personhood entails and on which most of it is based on autonomy, the rights of an individual, as well as rationality and sentience of a being. This may be slightly different within an African view in which personhood is seen and based on Ubuntu. Africans value having children and extending their families, as most Africans have larger families despite economic difficulties, unlike with most Western people, though I may be generalising. Children are seen as an inheritance and extension not only of the parents, but also of the community. This importance

of having children is also supported by Chuwa (2014, p. 42) in his work that "parents with children will be immortal as long as their children do not break the chain by not making children". Therefore, if an embryo is viewed as a 'fully developed' human being, it would be unethical to use human embryos in hESC research. 'Umuntu ngumuntu' implies that we should respect a person for being a person, regardless of what their social status, age, gender, size or race is. Every person deserves to be given the respect, dignity and life that come with being a human being. In addition, it becomes our duty to give them that life, respect and dignity that is owed to them as a person and this is not viewed as a right, but as a duty. The same question asked within the Western norm debates on personhood concerning the use of a human embryo for research and therapeutic purposes, that same question still applies to Ubuntu. The question being, when does a person becomes a person?

When do Africans start viewing umuntu as umuntu (a person, as a person), what does that even mean? Gade, in his study on this subject, How an African views a person as a person, (2012, 487-488) reports on how Africans (represented by South Africans) view umuntu. In his paper, he reports that "there are different ways in which this term is used. First it is viewed and understood to mean a *homo sapiens* (umuntu - as a biological entity), that you are born as a person and possess the qualities that make you one. Secondly, it is understood as a person who possesses Ubuntu, meaning that one has moral values and moral personhood that makes one umuntu". Ajune (2008) cites Wiredu's (1992) view which supports this notion as well, that there is a distinction between a human –a biological entity- and a personal entity with special moral and metaphysical qualities according to an African view. More so that one is either a human (biological entity) or not and there is no such thing as a potential human being, with personhood being more defined by the virtues that one will possess, and these being virtues of Ubuntu. Venter (2004, p. 150) additionally noted that umuntu is one that

possesses the following elements according to African views and norms: umzimba (body, form, flesh); umphefumulo (breath, life); umoya (soul, spirit); amandla or isithunzi (dignity, vitality, strength, energy, power, life force); inhliziyo (heart, centre of emotions); umqondo (head, brain, intellect); ulwimi (language, speaking, being able to verbally express ones' view) and Ubuntu (humanness, morality). According to African points of view, a person is valued higher and with greater importance than any other species or things or entity. If an embryo is viewed as possessing the above elements, it will be seen as umuntu that we should respect, protect its life and give dignity as with any other muntu, but also it will be unethical to use it for hESC research even with the potential of clinical therapies. Ubuntu sees a person as a higher entity and should never be used as means to an ends, this being similar to Kantian moral theory, although 'sacrifices' (one sacrificing his or her life- whether in part or as whole) are viewed as having Ubuntu and that person(s) is usually given praise and honour for their 'sacrifice' and esteemed above others. However this type of 'sacrifice' can only be performed by a 'fully developed' person (by this it will be a person who has Ubuntu who can demonstrate the virtues of Ubuntu by 'sacrificing' their life for others or community) and not a fetus or human embryo which is still yet to develop into becoming a person with Ubuntu for it to even make a decision to act in a humane way and express qualities of Ubuntu towards its community. For instance, the comrades that fought for South Africa's liberty sacrificed their lives and a chance to be with their families and children (those who were in exile). Their sacrifice was a display of Ubuntu toward their community. However, this cannot be said with an entity that is yet to develop into becoming a person with Ubuntu as it may not have the understanding in itself of how to express Ubuntu in that manner or even make that decision at that stage to do so. Therefore, based on just this it will be challenging to accord a human embryo the same moral status as a 'fully developed' human being which is a person who has and also displays the virtues of Ubuntu.

Human embryos used for hESC research are usually at the beginning of developmental stage, in their primitive stage (at 14 days), and according to Venter's above mentioned elements for being considered umuntu they are at a stage where they have not even developed any of those elements to even be regarded as a person (biological entity). Africans would find it very difficult to see it in that manner, even though we may be and are in fact aware that an embryo can further develop to have and possess those elements. However, those used for research do not possess those elements mentioned by Venter in his work and therefore, are not viewed as a person. Additionally, in most African cultures (speaking from a South African context), it is known and believed that a woman can only announce that they are pregnant after the first trimester as at this stage it is believed that the woman is now carrying a child ('fully developed fetus or baby' since we don't have a term for a fetus), as well as for spiritual and traditional reasons. This notion suggests that South Africans only start to view a fetus or baby as a baby not immediately after being conceived, but rather after the first trimester. Therefore, using an embryo as a means to an end would not be a violation of its 'right' to life, dignity and would not be disrespectful to that embryo and neither would it be an immoral act on the agent performing this act. Ubuntu is about the moral duty of the agent or progenitor rather than that of the 'patient' and in this case of the embryo. Because it is required that the moral agent act in for the maintenance of harmony and wellbeing in their community and not the patient or embryo in this case, albeit this action may be through the patient or embryo. However, it has to be largely for the community, to benefit the community at large. Any act that does not promote any of these virtues and values based on Ubuntu will be regarded as a bad or an evil act because it is not for the community's good and wellbeing.

Umuntu ngumuntu ngabay'abantu, speaks of the collectiveness and interconnectedness of individuals within the community. A person is not a person without other persons. You need

others in order to become a person and possess personhood. However, some have expressed great concern that this collective thinking could be used for abuse, oppression and promotion of one's selfish needs and not that of the community (as mentioned already). Furthermore, to be used as a counter weight to dominant ideas of individualism and coerce individuals in order to promote one's own mission which has nothing to do with the good of the community. However, Hailey (2008, p. 11) cited a vital point made by Khoza (1994) stating that "Ubuntu should not simply be equated with collectivism that merely stresses the role of the social unity to the point that it depersonalises the individual and their own humanity". I agree with this, especially when it comes to science and technological advancement, with inclusion to hESC research and therapy. Even though hESC research may be used to develop potential clinical therapies amongst other things if it does depersonalise the embryo as a human (seeing that according to Ubuntu there is no such thing as potential person), even if its use and/ or application is for the greater good of the community, it will be unethical to make use of the embryo in hESC research. Moreover, it would be deemed as immoral and not possessing Ubuntu on part of the researchers, companies, government, health workers etc, if they were to do so as they have the duty to protect the life, dignity and respect of the embryo as another human being. Seeing that there is no such thing as potential human being hence a fetus after 12 weeks is regarded as a person (umntwana - baby) and not a potential person neither would an embryo be regarded as a person. However, an embryo is not seen to be a 'person' at this stage or to even possess personhood by the virtues of Ubuntu. Thus, according to African views and norms, personhood is not something that a human being is born with, but gradually becomes and this must be learnt through and by being part of the community. Personhood is a continuous thing that one grows and develops into as they become part of the community 'ngumuntu ngabany'abantu' just like the biologist view on the embryos continuum process for which the notion is similar to the African notion regarding

Ubuntu (developing personhood) except that with Ubuntu development is taken after birth and as one becomes incorporated with his/ her community. Personhood is achieved through other persons within the community. Therefore, "a person is taken in its fullest sense as an individual who through mature reflection and action, has both flourished economically and succeeded in meeting his/her responsibility to his/her family and community" and displayed this through his/her virtue of Ubuntu.

In that regard, ones' identity and social status go hand in hand with one's responsibility or sense of duty towards or in relation to others. Moral status increases with growth as part of the community, and thus one becomes a 'full' person. This analogy is illustrated by some example such as funeral attendance within African communities and the meaning behind the number of attendees of that funeral, such as the differences seen between a child's and an elderly man's funerals. For a child's funeral, it will only be attended by a few people mostly just family and really close friends and neighbours, whereas for an elderly man's funeral there will be more people extending outside the really close friends and neighbours but also individuals that the deceased has made an impact on their lives or gotten to know him, both from his community and outside his community as well. The reason behind this is that they have different social statuses and that the elderly man has fully developed into a person (Umuntu onobuntu - a person with personhood) whereas a child has not. Moreover, based on his display of virtues of Ubuntu towards his community the elderly person's funeral will have more attendance. Since, through his life the elderly man has shown to have Ubuntu towards his community and others, and therefore more people will value him and feel like they have more of a lose, not that with a child it is not seen as lose. But the mourning of the two individuals is rather different based on their display of Ubuntu and interconnectedness with their community. Therefore, one learns what their responsibilities are including the values

and virtues of Ubuntu through the community and it is the same community that also gives them a certain social status so to say once they have matured morally. Chuwa (2014, p. 35) explains this better that "once an individual has acquired enough ethical maturity to act simultaneously for self and for the community, such a person is considered morally mature". 'I am because we are' only exists in relation to other persons. Self is not something that first exists on its own then enters into relationship with its surrounding (Murove cites Shutte 2009, p. 91). With the moral status being defined by the community as one becomes a part of the community, a human embryo cannot be regarded as a 'full' person because of its mere existence, but it must be given the moral status as it develops into a moral person and becomes morally mature, and for this it will require that it becomes part of the community as the tree in the Akan proverb.

A human embryo although, if allowed (provided it was implanted in a uterus or right environments) can grow and develop into becoming umuntu (homo sapien) and also into umuntu onobuntu (person with personhood). However, at the stage in which an embryo is used for research and therapy it does not possess virtues and values of Ubuntu neither can it be regarded as a umuntu onobuntu nor can it interact and interconnect with its community through these virtues which will define it as umuntu onobuntu. This does not mean that Africans do not care or value human embryo, but it means that they do not consider it as a person that has 'fully developed' because to be a 'fully developed' person you must exhibit virtues of Ubuntu and be able to display them within a community. In my own opinion a human embryo is not a 'fully developed' human being based on Ubuntu and based on my cultural background and find it hard to understand how instrumentalising it for research and therapy can be a moral issue as it does not have the same moral stand as umuntu onobuntu. Nor I do not have the same moral duty towards it as with a person who already is alive and

part of the community in which I have a moral duty and responsibility for. What is more important is to protect the individuals who are already forming part of the community and Ubuntu helps to identify and be able to set boundaries as to what entity (a *homo sapien* or one developing to become a *homo sapien*) is more valuable (with human beings, both as *homo sapiens* and those with Ubuntu including those who may be regarded as not having Ubuntu being highly valued above other entities) and how moral duty can be showed or probably distributed towards that entity.

As Africans we see every entity as possessing a certain moral value (not moral status as a person) and due to that everything on Earth (including the Earth itself) needs to be respected and given moral value. However, human beings (born and living) possess a higher moral value and will be considered first or as top priority than other entities on Earth, human beings' well-being and wellness is more valuable than anything else because Ubuntu is about showing those virtues of Ubuntu towards first others (these are those who are born and living human being). What an embryo has that is seen with all things, human beings and non-human beings, is *seriti (*life force) that all things possess and we are all interconnected together through *seriti,* and based on this an embryo can be awarded a moral respect and dignity, i.e. moral value. In order to have a better understanding of this *seriti* think of it as akin to the inherent dignity in a way or the higher energy that one possesses. As a result, all things are treated with respect because of this life force that provides them a moral value. This type of interconnectedness that makes one to be a fully developed person is a spiritual connectedness. Through *seriti*, Ubuntu sees all things in the environment to be connected with each other, whether it is plants, animals, oceans, and mountains etc., we see this notion being captured in the former President Thabo Mbeki's speech titled 'I AM an African' made on the 8th of May, 1996. This view is further explained by Chuwa (2014, p. 34) citing Nkrunah that "from an

African perspective everything that exist is in a complex web of dynamic forces in tension but with necessary interconnection complimentarily". As a result we are all bound by this life force and everything that possesses this life force therefore ought to be respected. "Every person forms a link in a chain of *seriti*… A living link, active and passive, joined from above to the ascending line of his ancestry and sustaining below to him the line of his descendants" (Venter 2004, p. 151). It is believed that *seriti* brings about either the good or evil in one and if *seriti* from a particular entity or thing is used for the wellbeing and good of the community it will promote harmony and goodness. However, a break of this *seriti* may cause destruction of harmony in the community and that is the reason why everything, even if it is not a human being ought to be treated with respect. Let me further elaborate on this; for example, a stone will possess *seriti,* but less than a plant which possesses it but less than an animal which possess it even less than a human being. So it differs as life forms gets higher and higher. The closer you are to 'higher life' such as human being the more *seriti* you will possess and now seeing that an embryo is created from a human oocyte and sperm, an embryo will have a much higher *seriti* than that of plants and animals, which are usually used to make traditional medicine. What do I mean by this? I mean that even though an embryo does not possess elements to make it a human being nor the values and social status required to give it the status of Ubuntu, it will however be respected and would be given the respect (as an entity that was developed from a human gamete) it is due to based on the *seriti* that it possesses.

To sum up, Nussbaum (2003, p. 21) state that "African views on personhood deny that a person can be described solely in terms of physical and psychological properties. It is with reference to the community that a person is defined". The importance of the community in self-definition is summed up by Mbiti "I am because we are"...It is the root of the self in the community that gives rise to sayings such as "umuntu ngumuntu ngabany' abantu," and these

roughly translate to, “it is through others that one attains selfhood”. The Venda saying “Muthu ubebelwa munuwe” (a person is born for others), also captures the interdependence between self and community. Personhood, moral personhood per se, in this view and norm indicates that for one to be a ‘full’ person and attain moral personhood (and given moral status), one has to have a relationship with one’s community. Through this interrelationship with one’s community, they are able to become a ‘full’ person (that is being umuntu onobuntu,) who has morals. Thus, Ubuntu says a person is not born with full moral personhood, but as one grows, and becomes part of the community, the community helps him/her in understanding their moral status. Moral status is not simply given after birth, but comes with all the values, community responsibilities and social status. In addition, one’s moral status changes as one develops into becoming a ‘full’ person, and in this way attains personhood. Personhood is a progressive and continuous process. It is not only based on intrinsic values, rationality and sentience as with the Western norms but also with one’s responsibility for his/ her community and displaying the virtues regarded as those that define Ubuntu within their community. Therefore, in this regard, the human embryo does not possess the same moral status as a ‘fully developed’ human person as they are not seen as a person in that stage of development as well, neither as one with Ubuntu. However, because the human embryo possesses *seriti* which is close to that of human beings it will be given respect or moral value and moral respect as with any other entity or natural occurring thing. Ubuntu as an African moral philosophy indicates that it will be ethically and morally acceptable to use an embryo for hESC research and therapy, provided that it is with moral respect to the embryo and the community which it comes from. What I mean by this (moral respect) is that the use of human embryo for research and therapy should not disrupt harmony within the community, but rather maintains all the values defining Ubuntu and promotion of

the wellbeing, solidarity and goodness of the community as a whole both physical and psychological and most importantly in healthcare and wellbeing too.

Tangwa (2000, p. 43) notes that amongst Africans, human wellbeing is "certainly given the highest priority and within this human wellbeing, a very high value was accorded to human health. Health is seen as the value of all values – that value which makes other values possible and achievable. As long as one was healthy, little mattered and all other achievements were within the bounds of possibilities". Healthy individuals meant a healthy community. The human embryo with its higher form of *seriti* than that found in plants and animals may be viewed as bringing a clinical benefit, if it is used with the respect that is accorded to the embryo as an entity with *seriti* whether or not this is traditionally used or scientifically (or as a 'western' medicine). 'Your pain is my pain' is a proverb used to illustrate that when one is sick in a community everyone is sick too. One's sickness is everyone's sickness, it is like a crack in an egg no matter how small it is the whole egg has a crack and is fragile. The clinical benefit from this research may be one of the reasons for accepting and favouring harvesting and culturing embryos for research. In some way it will be like the community is 'sacrificing' the embryo for the greater good and wellbeing of those already living within the community but for them as well. With 'sacrifice' as a notion of Ubuntu seen within the apartheid era when those who 'sacrificed' their lives were seen as performing a good deed worthy of the highest praise and an obligation to their community (Southern African blacks, with some few whites of course), in this case).

Debates on the potential personhood of the embryo and its moral status (which will award it the full rights of a 'full person') have halted progress in hESC research. Ubuntu does not

recognise an embryo as possessing personhood and having a moral status as a 'full' person, but an entity that should be given respect based on *seriti* which it possesses like any other naturally occurring entity. Personhood is not regarded as a status or right given from the very beginning of one's life at birth, but attained as one develops into his/her society and this indicates that the older an individual gets the more of a person that individual becomes (Menkiti 1984, p. 173), or rather expected to become. This may not always be the case as seen with rapist and thieves and so forth, as they are not regarded as having and displaying Ubuntu. Human embryo at the stage that it is used and harvested for research and therapy is not seen to possess Ubuntu or Personhood based on the notion of Ubuntu and its values as I have already described and as well as from my own cultural background. However, the duty within hESC research and therapy lies with the moral agent or progenitor (creating and researching as well as universities and companies and government) to ensure that this research is used not only for the clinical benefit of others, but to also maintain respect and dignity and harmony of individuals in local, national, as well as global communities. Because as we have seen from above explanations, Ubuntu is community based. This begins first with the individual's actual community, then extends to national community and then to the global community. The individual must exhibit and show the values of Ubuntu towards his or her community and be able to maintain those values in whatever they do, with inclusion to using and harvesting a human embryo for research and therapeutic purposes.

2.8 UBUNTU: OVERALL ARGUMENT FOR HESC RESEACH AND THERAPY

Ubuntu justifies the instrumentalisation of human embryo for research and therapeutic purpose despite the original source being a human embryo[6]. An embryo according to the principle of Ubuntu is not regarded as a 'fully developed' human being, since a 'fully developed' human being is a person who portrays the virtues that defines a person who has Ubuntu (umuntu onobuntu). In addition, a person with Ubuntu develops these virtue as they grow and interconnect with their community, thus Ubuntu being regarded as a progressive state and not something that a person can be given at birth. This means that in an African perspective a person develops into a person with personhood as they grow and interconnect with their community and personhood is not given to a person at birth.

What may be important is that within an African perspective an embryo is an entity that needs to be respected as with any other entity, thus given moral value through *seriti* which connects all of us. *Seriti* connects all things that exist on Earth together and because of *seriti* moral agents have a moral duty to use all other entities with respect because of the interconnectedness that a moral agent has with those other entities. Therefore, there is nothing morally wrong in using human embryos for hESC research and therapy, because an embryo is not viewed as a 'fully developed' human being therefore it does not have the same moral status as a 'fully developed' human being. Moreover, in African language (speaking from a South African perspective) there is no such thing as a potential person; You are either a person or not a person, even a fetus (after 12 weeks) is addressed as a baby anything before

[6] Obviously, I am not suggesting that there are no variety of thought when it comes to the status of the human embryo seeing that SA is so diverse, but this is a common philosophy followed by many people.

that 12 weeks has no particular name (such as a baby or person) and not even regarded as a 'potential' baby or person. A baby will be seen as a person who will develop to being a person with Ubuntu as they grow and become integrated and interconnected and live within a community, and through this process will then develop the virtues of Ubuntu, i.e. umuntu ngabanye abantu. We cannot say the same when it comes to an embryo and cannot even consider an embryo to have a moral status equal to a human being but a moral value that all other entities have and because of this moral value can be given respect. But this does not mean a human embryo cannot ever be used and harvested for research and therapeutic purposes.

What is very important is the wellbeing and health of those who are living, as a healthy individual means a healthy community. Therefore, any technology that will bring such will be regarded as a greater good and be sought after no matter the starting source. Therefore not allowing hESC research based on issues concerning the destruction of the embryo and its moral status (for which is not a problem in African perspective) will be seen as an affront to the community as a whole. It will not make sense in prohibiting or preventing or not creating an environment in which such research and development of therapies can be facilitated for those who are living and suffering already based on the ethical issues at hand[7]. This will be considered to be unethical and morally wrong, that is why it is crucial that SA's policy and regulatory makers take this into great considerations and weigh such issues against the principle of Ubuntu. The country is in need of self-realisation and this can be through a legal framework that represent socio-cultural values.

[7] I acknowledge that there is a range of views and some people may have contradicting views.

2.9 CONCLUSION

All the different sources of human embryo for hESC research and therapy have similar ethical issues. Ethical issues regarding these sources are due to the destruction of the embryo which leads to the questioning of the moral status of the embryo. In addition, other ethical issues that are of equal importance are those of informed consent, oocyte donation, patent issues and commodification of oocyte and embryos. The main issue regarding these sources and procedures is the moral status of the embryo.

The moral status of the embryo has been argued using different normative principles. Some have argued from the biologist point of view which sees this status as a continuum progress. Some see the moral status as starting from fertilisation (the absolute view) and others only after its primitive streak (14 days). Normative arguments that have been used for debating the instrumentalisation of the human embryo for hESC research and therapy include those from the principle of deontology based on Immanuel Kant's moral principle. This principle does not allow any use of human beings as *mere* means to an end and emphasize that human beings are ends in themselves. However, this principle indicated that an embryo may be used as a source for hESC research, as this may not be using it as a *mere* means but a means to an end. Another moral theory applied in these arguments is the principle of utilitarianism, which promotes the greatest happiness. Utilitarians view the potential clinical benefit as being the maxim that they consider in favour of hESC research and therapy, albeit there are some who argued using this principle against the use of the human embryo for research. As a result of both principles not coming to a proper conclusion regarding the moral status, I further discussed one of the fundamental debates on this issue that being 'potentiality' of the human

embryo. Potentiality arguments showed that an embryo at the stage that it is used as a source for research and therapy is not yet regarded as a 'fully' human being and is thereby not accorded the same moral status.

In conclusion, Western personhood norms and views do not regard the human embryo as being a 'fully developed' person and therefore owed the same moral status as a moral agent. The reason I make this conclusion is because all the ethical debates (as mentioned in this chapter) surrounding hESC research and therapy are based on the destruction of the embryo that it is a potential human being, due to the embryo's special moral status which is seen in virtue of that human embryo that it has the potential to develop into a 'fully developed' person (Watt & Kobayashi 2010, p. 21). Western moral philosophies do not regard the human embryo as having an equal moral status with a 'fully developed' person and therefore, do not award the embryo with that moral status.

The same conclusion was also noted within the African moral philosophy of Ubuntu. Ubuntu does not recognise an embryo during the stage in which it is harvested for research and therapeutic use as having a moral status akin to those of a 'fully' developed human being. Thus, with no such a concept as 'potential human being' within an African context an embryo does not possess Ubuntu (personhood) and therefore may be used for research and therapeutic purposes. In conclusion, there is no reason for not harvesting the human embryo for hESC research and therapy. I will then end this section with a quote by Martin Luther King Jr which may shed some insight concerning hESC research and therapy… "*An individual has not started living until he can rise above the narrow confines of his*

individualistic concern to the broader concern of all humanity"... (http://www.brainyqoutes.com).

CHAPTER 3: ALTERNATIVE STEM CELL SOURCES FOR HUMAN EMBRYONIC STEM CELL.

3.1 INTRODUCTION

"Stem cell technology is rapidly expanding the field of regenerative medicine, allowing for the de nova production of functional tissue and providing for new diagnostic and therapeutic capabilities that may surpass the risk-benefit profile of conventional reparative methods" (Zacharias *et al* 2011, p. 634). It is not difficult to see then why stem cell research offers great promise, as already mentioned in the previous chapters, for the understanding of basic mechanism of human development, differentiation as well as hope for new therapies and treatments for diseases. This great promise is due to stem cells' ability to proliferate in an undifferentiated state both *in vitro* and *in vivo*, and differentiate into specialised cells. These specialised cells can then be used to develop new therapies and treatments of disease. As reports show, stem cells are found in all of us from early stages of human development to the end of life (The National Academies 2005, p. 3). They can be further characterised into different categories due their capability to proliferate along multiple cell lineages and produce three germ cell types (Herberts, Kwa & Hermson 2011, p. 1). Stem cells can be classified as either totipotent, pluripotent and/ or multipotent with some stem cells being reported to be unipotent. Multipotent stem cells are stem cells that are capable of producing multiple, but not all, cell types (The New Atlantis 2012, p. 11).

Pluripotent stem cells include hESCs, as well as the recently discovered induced Pluripotent Stem Cell (iPSC), and the multipotent stem cells include Adult Stem Cells (ASC). Ethical issues and controversies that have surrounded hESC research have become a hindrance to this research by slowing down research progress within this type of stem cell technology. Most of these ethical issues have been around the destruction of the human embryo and its moral status which I have already discussed in chapter 2. In addition to these ethical issues, hESCs have several other drawbacks, such as: formation of the teratoma and to avoid this hESCs will have to be induced in order for them to differentiate towards the desired cell lineage (mesodermal or endodermal or ectodermal) before implantation. Teratoma formation limits hESC application under certain conditions as it renders them incapable of self-replication. A further treatment cycle is required as the original graft would progressively be ageing and degenerating and in order to overcome this problem a wide-scale application involving the technique of 'therapeutic' cloning is required, which will also assist with tissue rejections after engraftments (Oduncu 2003, p. 10). Thus, ethical issues regarding therapeutic cloning i.e. SCNT, have been mentioned and discussed already, however, in addition to that "this treatment will be very time-consuming, labour-intensive and very expensive" (Oduncu 2003, p. 10) and this adds to the existing disadvantages of hESC technology.

In order to address these technical but also ethical issues concerning hESC research, scientists have been trying to find new alternative ways of harvesting and culturing stem cells that will behave and have similar characteristics as hESCs. Therefore the promise of using other stem cell alternatives that are less controversial than hESCs has been proposed with the hope that these stem cell alternatives will not require the destruction of the human embryo and will avoid the ethical issues surrounding hESC research and therapies. The proposed alternatives include: ASC and reprogramming of adult somatic stem cell, a process called iPSC.

Therefore, in this chapter I will analyse and discuss both these stem cell alternatives and whether or not they are less controversial than hESC, including issues relating to their technical, manufacturing and clinical applications. It is important that I address these stem cell alternatives since they are currently being seen as being morally better to use in stem cell research and therapy. However, I want to show that these stem cell alternatives may also have their own share of unseen ethical hurdles and issues. Moreover, there is still a need to use hESC as source for stem cell research and therapy.

3.2 ADULT STEM CELL (ASC)

I will begin first by discussing the multipotent ASC. Because the ASC was compared to the hESC (mostly with regards to ethical issues) in the beginning and was viewed to entail less serious ethical issues, it is vital for this study that I address some of these 'lesser' ethical issues as well as the technical and clinical difficulty it poses as opposed to hESCs. ASCs are known to be found in different bodily tissues with their natural function being the maintenance and regeneration of aged or damaged tissues by replacing lost cells. In general, Herberts, Kwa & Hersem (2011, p. 3) state that "these undifferentiated cells are found throughout the body in juvenile as well as adult humans". The National Academies (2005, p. 7-8) report that "these multipotent somatic stem cells (as called at times) or ASC, are hidden within the organs, surrounded by millions of ordinary cells and may replenish some of the body's cells when needed. In addition, some of these cells are currently being used in therapies and have been found in several organs that need a constant supply of cells, such as

blood, skin, liver, lining of the gut, brain, muscles, bone marrow, cord blood and adipose tissue. As a result, ASC can be divided into different groups depending on their morphology, cell type markers, differentiation potential and/ or tissue of origin. These include Mesenchymal (or Stroma) Stem Cell (MSC), Haematopoietic Stem Cell (HSC) and Endothelial Progenitor Cells (EPC)".

*"*Scientific interest on ASC has been based on their ability to divide or self-renew indefinitely and differentiate (with a limitation) to yield all the specialised cell types of the tissues from which it originated*"* (Herberts, Kwa & Hermsen 2011, p. 3). The use of Adult Stem Cells has been relatively uncontroversial (especially ethically) and has been carried out for decades for a variety of clinical purposes. Clinical therapeutic use and benefit of this technology has been reported as early as in the 1950s relating to disease cases involving bone marrow transplants (The New Atlantis 2012, p. 11). Experience within this haemato-oncological field of bone marrow transplantation shows that "ASC are not prone to teratoma formation, which is one of hESC limitations, in addition, they also appear to retain their self-replicating capacity while contributing to tissue development or regeneration" (Oduncu 2003, p. 10). Moreover, they are easily obtainable as the patient can use his or her own cells which can be grown (cultured) and genetically modified for therapy. This further reduces and limits graft rejection by the patient or recipient, whereas with hESC (allograft) there is a possibility of graft rejection by the patient or recipient.

However, despite all these advantages there are several limitations of ASC as a stem cell technology. For instance, reports by both Bongso & Richard (2004, p. 838) & Oduncu (2003, p. 10) suggest that this type of stem cell is "very difficult to isolate and characterise, with a

few being confirmed to exist in human tissue and those that can be isolated with relative ease are unfortunately difficult to scale-up in culture and their true latent plasticity being unclearly established as well". Plasticity is a vital characteristic in stem cell technologies as it assists in an increase of potential for therapeutic usage and treatment. However, "some of the ASC have been found and these show more flexibility (in terms of their plasticity) than previously thought and made to be" (The National Academies 2005, p. 8). If this is found to be true it may change how ASC are used and viewed in stem cell technology as plasticity is one of their most important limitations for being used (or not) in the discovery and development of clinical therapies. Another limitation to this technology includes autologous delivery of cell, although this may be an advantage in terms of limiting graft rejection. However, this is a limitation as it delays treatment which may be urgently required and needed to save lives (The National Academies 2005, p. 8).

In addition, there are some ethical issues around ASC, although not as great as those found in hESC technology. There are ethical issues and concerns regarding informed consent, such as obtaining the consent of the somatic tissue from a donor, especially if the donor is not the recipient. Adult Stem Cells can also be obtained from fetal tissue and because of this, they are prone to some ethical issues akin to hESCs, however, they may likely be less controversial than those of hESCs given the late stage of the fetus development (The New Atlantis 2012, p. 101-102). All the ethical issues regarding respect for persons and violation of dignity and that of the fetus will pose some ethical problems. Furthermore, one will have to further define and identify issues regarding personhood because a fetus compared to an embryo (required for hESC research and therapy at 14 days) is at a much more developed stage. Another important ethical issue concerns issues of Intellectual Property Rights (IPRs) and ownership of these

somatic cells through patents as well as issues of commodification. I will address this issue further in later chapters.

Despite entailing fewer ethical issues and concerns than hESCs, ASCs have technical problems, as they still need to be stimulated in order to make them more versatile than they currently are. Informed consent issues need to be further discussed as this may result in hindering ASC research and technology. (For example, informed consent issues regarding respect of autonomy, privacy and confidentiality concerning the research itself and the type of research study the sample may or not be used for). Or if the sample is used in genetic studies, as well as the type and extent of information required to inform donor and issues relating to IPR and commercialization in the future amongst others). Especially if this technology will be used and required at a larger scale and thus have to be manufactured in a broader scale for availability. Therefore the use of ASCs as an alternative has not been shown to eliminate all the ethical issues that are also noted with hESC technology as well as technical, manufacturing and clinical limitations. Moreover, when comparing hESC to ASC, hESC has a great potential for increasing understanding of basic development processes as a tool for the development of cell-based therapies (with graft rejection being overcome with the use of SCNT) and as an invaluable model for the study of early human embryogenesis (Bongos & Richards 2004, p. 840). Despite ASC having fewer ethical issues in terms of their moral status, ASC may not be applied as a single stem cell technology apart from hESC until all these technical and manufacturing problems associated with this technology are resolved.

On that ground, for the next section I will analyse and discuss the recently 'discovered' adult somatic tissue use, which have been reprogrammed into a pluripotent state, thus improving

their capabilities and plasticity problems previously reported with ASC. Reprogramming of Adult/ or Somatic Stem Cell is known as the induce Pluripotent Stem Cell (iPSC) and these cells have shown to have pluripotency akin to hESCs and therefore in the next section I will analyse this stem cell alternative.

3.3 HUMAN INDUCED PLURIPOTENT STEM CELL (HIPSC) RESEARCH AND THERAPIES

The human iPSC is harvested and cultured through a novel technique of reprogramming the ordinary human dermal fibroblast, a technique described by Yamanaka and his team. They reprogrammed the human dermal fibroblast by utilising this somatic tissue with a set of transcriptional factors of Oct4, Sox2, Klf4 and M (OSKM) into the cell resulting in an innovative method of achieving pluripotency of a somatic or adult cell (Zacharias *et al* 2011, p. 636 & Zhang, Angeles & Zhang 2010, p. 2). In addition, Thomson and his team also reprogrammed human somatic cells to produce a hiPSC. However, unlike Yamanaka and his team they used a different set of transcription factors using Oct4, Sox2, Nanog and Lin28 (OSNL) (Zacharias *et al* 2011, p. 636 & Zhang, Angeles & Zhang 2010, p. 2). Figure 3.3.1 shows a diagram of how these iPSCs are cultured using somatic cell reprogrammed with a retrovirus vector as well as the embryo-independent procedure to culture and harvest pluripotent stem cells. Ever since both Yamanaka and Thomson's reported on their findings, this embryo-independent nuclear reprogramming of iPSCs has been found to be remarkably reproducible and has shown to resemble hESCs in many aspects including; gene expression,

morphology, epigenetic status, proliferation, the ability to differentiate into the three cell lineages and pluripotency markers.

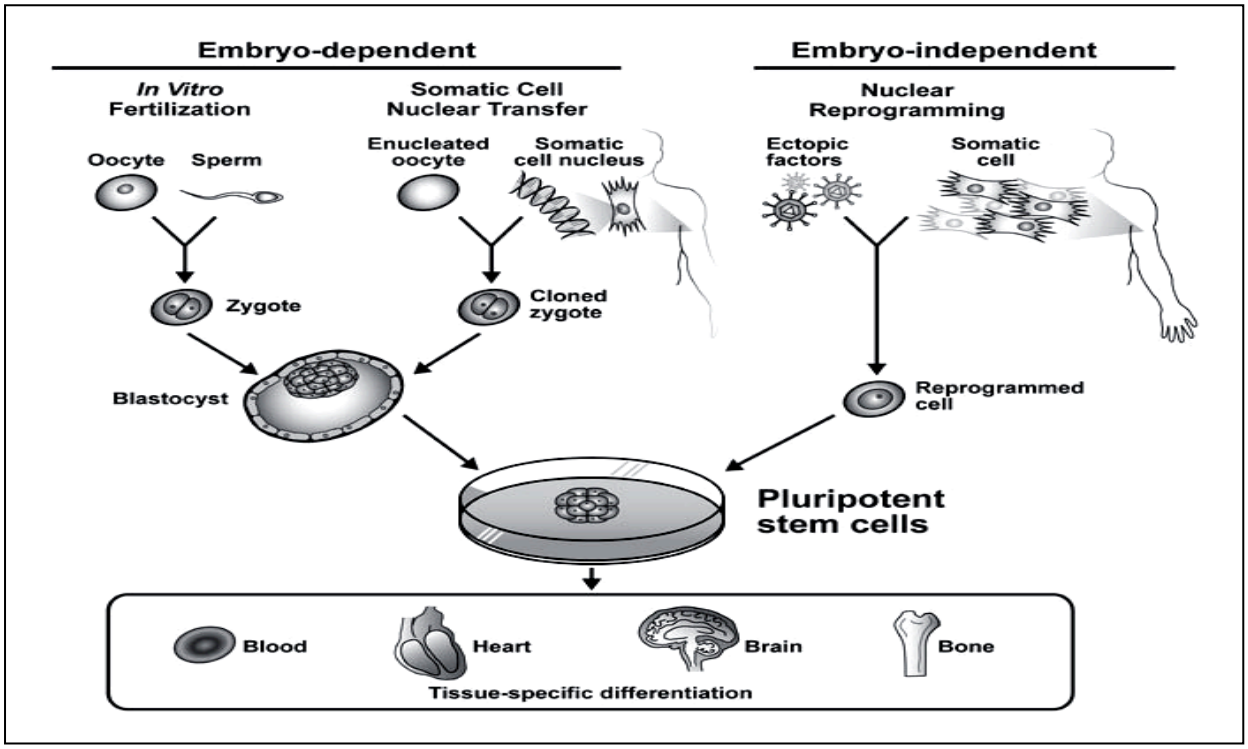


Figure 3.3.1 Diagram showing embryo-dependent procedures of IVF and SNCT as well as the embryo-independent procedure of reprogramming somatic cells using gene factors and retrovirus vector to culture and harvest pluripotent stem cell (Zacharias *et al* 2011, p. 636) (Permission to use this figure has been granted).

The current iPSC technology is far from perfect, with Yamanaka and Thomson's direct approach of reprogramming being widely studied as it offers the possibility of harvesting and creating a mature nucleus by reprogramming it to the state of maturity, by just introducing the cells and a majority of retrovirus in order to induce transduction. However, this technique has

shown to be clinically problematic as it may result in random insertion of genes within a genome. Recently there have been a number of other techniques that have been proposed and currently being studied.

Figure 3.3.2 shows the different methods for direct reprogramming of iPSC technology and that of IVF for harvesting hESCs to culture cells to pluripotency state. "Some of these studied techniques include the use of non-integrating viral vector such as lentiviral or adenovirus with this lentiviral being considered as a gene trans-vector as it can infect both proliferation and non-proliferating cells. Furthermore it has also shown to successfully infect hematopoietic stem cells" (Yang 2010, p. 9-10). As a result lentiviral has been constructed for the delivery of OSKM gene for iPSC generation. However the use of lentivirus has some disadvantages as, "it is derived from an immunodeficiency virus and thus poses safety concerns". Moreover, lentivirus vector, "have a limited insertion size and difficulty in storage and quality control" (Yang 2010, p.10), with further studies and improvement still required.

Apart from lentivirus as vectors there have been attempts and investigations on generating iPSC without viral integration and these include; "the repeated transient transfection of plasmid based vectors" (Zhang, Angeles & Zhang 2010: p. 4). Reports by Zhang, Angeles & Zhang (2010, p. 4) have been made which show that "a single plasmid was used that had a 2A peptide linked reprogramming cassette c-myc-klm4-oct4-sox2-iremorange, flanked by lox-P sites, PCAG2IMKOSMO". This vector was introduced into a mouse fibroblast and was found to be the reason why stable cell lines were established and exhibited a reactivation of endogenous Oct4, Sox2 and C-myc genes, with pluripotency being achieved and this showing the same result in human cells experiments (Yang 2010, p. 12). However, "this method shows

to possess extremely low reprogramming efficiency with slower kinetics" (Zhang, Angeles & Zhang 2010, p. 4).

Another method that has been investigated is the piggyback transposition system which serves as a vehicle for up to 10 kB (kilo base) cargo capacity without losing transposition efficiency (Zhang, Angeles & Zhang 2010, p. 10). This method has been shown to deliver large genetic elements without significantly reducing the efficiency, thus, maintaining the appropriate levels of reprogramming factors through several cell divisions, allowing the gradual process of reprogramming to occur. Yang (2010, p. 12) reports on "a recent method that demonstrates the possibility to reprogram adult cells with small (quantity) chemical molecules to replace transcription factor (such as Oct4, Sox2, C-myc, Klf4 and Nanog) delivered by transgenic methods. This method shows uncertainty regarding the future utility of the resulting stem cell which is raised by altering the chromatin structure through genetransduction". All these methods are being studied in order to improve iPSC reprogramming for clinical application, so that safety and efficiency is proven before this technology is applied clinically or for therapeutic purposes.

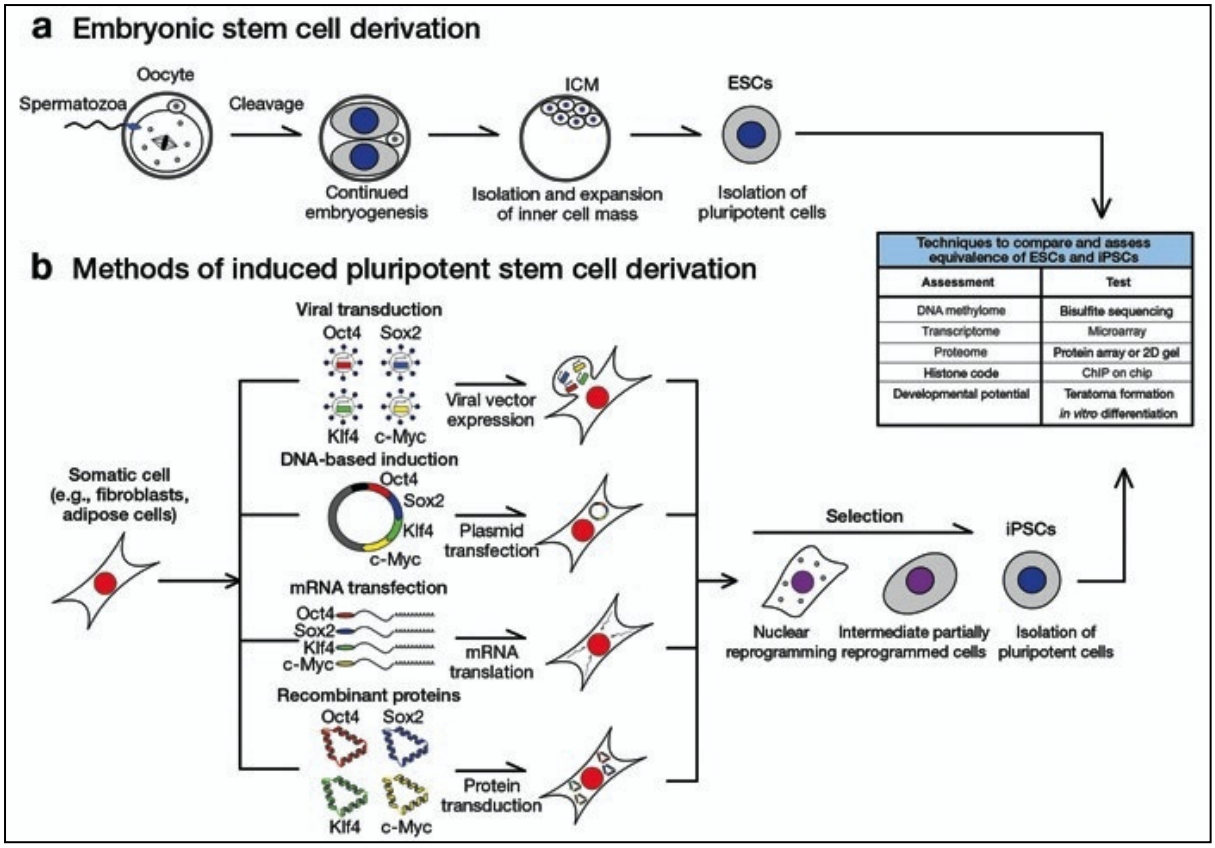


Figure 3.3.2 Diagram showing the harvesting and culturing of pluripotent stem cell with (a) representing harvesting and culturing of human embryo from IVF procedures and (b) represents the different direct methods applied to harvest and culture iPSC with somatic cells (Narsinh, Plews & Wu 2011, p. 637) (Permission to use this figure has been granted).

3.4 TECHNICAL AND CLINICAL PROBLEMS CONCERNING HUMAN INDUCED PLURIPOTENT STEM CELLS

Human iPSC technology is associated with the same major hope associated with hESC technology that it will facilitate therapies for diseases and thereby alleviate human suffering, but most importantly it will make provision for specialised cell therapies. However, clinical

issues associated with this technology use (use of the cells) are complex as Zarzeczny *et al* (2009, p. 1035) reports. Thus, hiPSC protocols rely on a combination of selection and attribution to isolate reprogrammed cells that display Embryonic Stem Cell (ESC)-like properties. There are indications that in most cases reprogramming usually takes a number of weeks and involve the emergence of a rare ESC-like phoenix from a vast number of somatic cells that have succumbed to their own mortality. In the case of this newly derived iPSC it is still unclear as to whether or not mortality occurs as a consequence of the target cell being converted to an ESC-like state or whether infrequent targets exist that have a genetic predisposition for immortality that is played upon reprogramming factors (Holland & Stanley 2008, p. 28). Moreover, the four genes which are introduced through the retrovirus vector may ultimately not be good for use because the technique has shown to result in inducing cells that carry multiple copies of the retrovirus, with mutation becoming easy and this may cause tumours in the tissues that are grown from these cells, as Holland & Stanley (2008, p. 28) report.

In addition, "one of the four genes, C-myc, was found to induce tumours in a substantial percentage (20%) in mice produced using iPSC, these mice where chimeras produced by injecting a few iPSCs into a mouse blastocytes and implanting the blastocytes containing a mixture of the original IMC and the iPSCs into the womb of the mouse, such that live pups were born whose bodies were composed of tissue generated from the original cells and the iPSCs" (Solomon & Brockman-Lee 2008, p. 4). Therefore, hiPSCs have a potential to form teratoma, which are tumours characterised by the presence of cells corresponding to all three embryonic germ layer if transplanted into a patient and another potential risk being tumorgenisis. Another clinical consideration for potential therapies may include 'a genetically manipulated cell' type of iPSCs and this may increase the regulatory hurdles and

require new methods of 'quality assessment and evaluation', especially to meet the therapeutic quantities that will be needed and required. To date, there are no reports that indicate how transplanted iPSCs might achieve lasting organ regeneration and repair (Sugarman 2008, p. 2). In addition, clinical and therapeutic issues relating to defining the cell type will prove to be challenging since being able to define iPSC characteristics, addressing differences in the cell types, derivation process and differentiation potential will all be questionable and these are some considerations that regulators or policy makers will need to consider and answer (Zarzeczny *et al* 2009, p. 1036). Moreover, other vital clinical issues concerning iPSCs, is "whether iPSCs will be governed by the same regulations that apply to other cell based products" (Zarzeczny *et al* 2009, p. 1036) or not.

In addition, "whether every new iPSC line will need to be considered as an individual product for evaluation or whether there will be a process approval approach" such approval approach being, "based on the methods applied (as in surgical procedure) rather than the products*"*. Even though iPSC is patient-specific it can be costly and unreproducible (the exact same type of tissue due to tissue or technical differences that may occur during the development of one patient-specific tissue to the other. Therefore, we can never tell whether the line will have the same clinical effect from one individual to the other). Thus the iPSC has to have a rapid method to determine the quality of newly established iPSC lines and can be inexpensive or affordable (Sugarman 2008, p. 2). Thus, reprogramming and production of hiPSC lines for therapeutic purposes should prove to be safe in different ways, including safety from the risk of tumorigenicity, the risk of encountering unpredictable adverse effects after receiving the cells and the risk of immune reaction. Furthermore, the efficacy of these cell based therapies and products as well as regulatory standards needs to be known and resolved. Therapeutic potential of hiPSC is favored by many because they are patient specific, although this could

be expensive and limited and only affluent individuals and countries may be able to afford them. They also do not face the immunological barrier that confront cells derived from human embryos. Thus patient-specific advantages can be viewed as an affront to those who cannot afford such treatment and this may be against human dignity and justice. As many poor and disadvantaged people and underdeveloped countries may not be able to afford these hiPSC therapies, resulting in a limitation of their 'right' to health and healthcare access. This is in agreement with Taylor, Bolton & Bradley (2011, p. 2318) who are also of the opinion that "these products will be expensive and may only benefit opulent individuals who are able to afford to pay for these treatments or patients who reside in affluent countries with a well-resourced healthcare system, but it is unlikely to benefit and help a significant proportion of potential beneficiaries worldwide".

With the current situation on health and healthcare problems worldwide, more especially in underdeveloped countries (such as SA) therapies that can be affordable and available to everyone or all (including different races and gene pool) are of paramount importance. Human iPSCs like any other stem cell based therapies should be available in large quantities and benefit everyone who requires this as a therapy and not just a minority few. Taylor, Bolton & Bradley (2011, p. 2318) say that "an alternative approach to ensure that this therapy is made available to everyone is to establish stem cell banks (as with hESCs as well) which will be selected to treat a potentially unlimited number of patients on the basis that any given patient may expect to receive stem cell derived tissue that is closely matched or compatible (as distinct from identical) by their Human Leukocyte Antigen (HLA) donor tissue to theirs". Furthermore, patient specific hiPSCs are invaluable tools at least to study some disease such as psychiatric diseases, neurological and genetic disorders or unexplained infertility. Although the hiPSC is a good model for most diseases, in some disorders especially when

phenotype is epigenetically regulated these may differ to those of hESCs where hiPSCs may be a good model for phenotype and hESCs for modelling genotype (Sugarman 2008: p. 4). This is another reason why hESCs cannot be totally ruled out as a stem cell technologies to be used. In addition, to "safety concerns there are also manufacturing hurdles to overcome for therapeutic application. Animal products or non-human iPSC feeder cells used to generate and passage cells will need to be replaced by defined media and matrices to avoid immune response to animal protein to obviate the risk of xenotransmission of zoonotic infection*"* (Leeper, Hunter & Cooke 2010, p. 522). Thus, hiPSCs still have a lot of hurdles to overcome in terms of both technical and clinical applications as well as from the regulatory and legal perspective. Apart from technical, manufacturing, clinical and regulatory barriers, hiPSCs have other issues to overcome, ethical issues that surround any other biotechnology innovation. In the next section I will discuss the ethical issues and concerns regarding hiPSC research and therapy.

3.5 ETHICAL ISSUES RELATED TO HUMAN INDUCED PLURIPONTENT STEM CELL RESEARCH AND THERAPIES

Induced Pluripotent Stem Cell technology has seemingly avoided all the heated ethical debates, attraction and issues unlike with hESC technologies. In fact it has been hailed "as the stem cell technology that would help resolve most of the ethical dilemmas associated with hESC research and therapy*"* (Zarzeczny *et al* 2009, p. 1035). Lo & Parham (2009, p. 209) in support of the statement made by Zarzeczny *et al* cite the President's Council of Bioethics

saying that “it is ethically unproblematic and acceptable for use in humans and that neither the donation of materials to derive hiPSCs nor their derivation raises special ethical issues”. Moreover, because skin biopsy is used, obtaining somatic cells is relatively non-invasive therefore there are no concerns about risk to donors compared with oocyte donation. This ready availability of hiPSC samples which can be possibly taken without one’s knowledge or consent as well as the general acceptability of this technology (which is in contrast to hESCs), means that this technology may warrant some particular ethical consideration such as respect of persons or autonomy, privacy and confidentiality which all form part of an informed consent. Respect for persons in research, more so in biotechnology research, imposes a moral duty on the scientist or researchers to recognise human beings and/ or participants as having an interests of their own that must be respected and never to treat that individual as *mere* means to their research’s end. Cases such as those of Henrietta Lacks (amongst others) serve as an epitome examples of how somatic cells can be easily obtained by physicians and researchers without the patient’s knowledge and consent.

Informed consent is extremely vital, more so with biomedical research and therapies or clinical trials or human tissue research, as this does not only make certain that the participant’s or patient’s autonomy is respected, but also ensures that his/her privacy and confidentiality will also be maintained. Autonomy is respected when all the information regarding the research and study is explained in detail and the participant understands everything that will be performed, reasons for the research and what the research entails amongst other information, before he or she can make that decision to participate by donating their somatic tissue samples. Human iPSCs, whether from a living and/or deceased individual carry “that individual’s DNA ‘fingerprint’ which contains an immeasurable amount of information about the donor” and the individual’s family including genetic predisposition to

certain diseases (Zarzeczny *et al* 2009, p. 1032). Furthermore, during the withdrawal of the informed consent participants should be made aware that their privacy and confidentiality will always be maintained even if their cell lines are shared across borders and amongst researchers. Informed consent needs to be voluntary in order for that individual donor's consent to be valid for that particular research and this will ensure that any assumption of risk, such a possibility of a physician's coercing their patient to donate, is eliminated and the participant's consent is completely voluntary and their autonomy is respected (Zarzeczny *et al* 2009, p. 1033). Additionally, there are informed consent issues pertaining to the amount of information that should be given to the donors or participants, such as withdrawing from the study and IPR issues amongst others that will need to be dealt with, discussed in depth and resolved before this technology can be developed any further.

Related to IPR and as way to being able to maintain one's autonomy as well, also includes issues as to whether the donor still has an interest in their own tissue samples after donation or not, i.e. ownership of somatic cell tissue sample. What are the legal rights that the donor has on his/her own somatic tissue samples as well as other entitlements and benefits (if any) from their sample? Whether there was a direct or indirect use to any process developments and/or therapies or not this would not matter. However, it is highly unlikely that all donated somatic tissue samples will have any scientific value which can be extended to development of therapies, product and commercialisation of such therapies. Additionally, issues of what benefits the donor expect from his/her participation since the researcher will somehow gain some scientific knowledge from his/her sample. Whether or not their sample's information brings about a patentable subject matter or therapy or commercial profit this would not matter. However, the issue is whether benefits from this research and/or exploitation of the patents need to be shared with the donor(s) or not or how to share these benefits. This is

particularly important because this information from the donor's sample can be applied for the improvement of hiPSC assays tests or used in drug screening, hence making provision for drugs that have a better efficacy or for the betterment of manufacturing methods. On the other hand, the donor's samples may have made some significant impact on research which may ultimately lead to a new process or products or patentable subject matter or commercial gain. Therefore, the donors need to be made aware of these possibilities and of whether there are any benefits (direct and indirect ones) just as when there are no 'significant' results from his/ her somatic tissue sample.

Somatic cell patents have raised many questions as to whether or not donors do or can retain their property or ownership interest and right over their bodily tissue or genetic matter after being retrieved for research. An illustration of this is a case (amongst others) that became "one of the proverbial default rule in property law stating that individuals do not have property or ownership interest in their own cells once they are removed from their bodies, that case is that of *Moore v. The Regents of the University of California*. In the John Moore case, a researcher at the University of California, Los Angeles (UCLA) medical centre used John Moore's spleen cells without his knowledge or consent to develop a profitable cell line. However the court ruled in favour of the researcher and university and said that Moore had no property interest on these cells but the researcher and university did" as Obasogie & Theung (2012, p. 53) states, and thus based on the court's decision Moore lost property or IPR of his somatic cell samples that were used. This case, somehow, indicates that somatic cells may be (according to the court's decision) patented and any benefit from these patents need not be shared with the donor, as (assumingly) the donor has no interest and property rights over his/her own tissue samples. In addition, others have argued (based on the court's decision, including the one above) that "the donors original cells are significantly

manipulated, transformed and expanded in different ways by researchers and no longer resemble the donor's original cells. Despite the resultant hiPSC line being genetically identical to the donor, the cells are arguably transformed into a new and distinct product that bears little resemblance to the cell originally taken from the donor*"* (Zarzeczny *et al* 2009, p. 1034). This notion is similar to the first biotechnology patent that was awarded to Chakrabarty in 1980 (in the *Chakrabarty vs Diamond*-case) regarding a genetically modified micro-organism. The patent was awarded to Chakrabarty because the patent was for a genetically modified micro-organism which was no longer the same as the ones found originally in nature and that their genetic marker was different. Therefore, hiPSC patents (as seen with the Moore's case) could be awarded based on manufacturing process and that their genetic markers or cells are no longer the same as those of the donors and this right is granted to researchers or institution or company and not the donor.

On the contrary, this may not be easily accepted as with micro-organisms because human tissue and entities are viewed (by many) to hold a higher moral value than micro-organisms or any other samples obtained from the environment. Thus, the tissue sample will still have genetic information that is not just of the individual, but also of their families, relatives and even their communities to some extent. This entails an ethical concern regarding hiPSC patents as this technology will create "a profound challenge for property law which has gone wholly unnoticed if the legal justification for diminishing individual's property" or ownership interest of their own somatic cells and acknowledge scientist's claim to own such material (Obasogie & Theung 2012, p. 54). This, in turn may also have the potential to make profit out of these samples without the donor having a say or gaining from these lucrative profits and not even being able to afford any of the therapies developed with the use of their own somatic tissue sample (what I like to call the Henrietta Lack dilemma). Consequently, this

entails an important ethical concern pertaining to issues of justice, social justice, such as allocative and distributive justice from this stem cell technology. Issues regarding justice have become important ever since the Human Genome Project (HGP), where most of the donors or participants would not benefit from these therapies neither could they and their families afford these therapies as most of them are from poor and disadvantaged backgrounds and could not afford medical healthcare. Patents tend to also exacerbate these ethical issues when it comes to issues of access to public healthcare as well as issues of social justice, since they may have an impact or influence the market value (albeit patents are not directly linked to market prices of therapies) of these therapies making the market price high. This can make these therapies unaffordable with only a few able to access them and hence this being unfair, unjust and violating the donor's as well as others dignity.

There is no doubt that more research is required in order to determine whether these biopatent concerns are justified and how they have an impact on research and development. However, hiPSCs also face the same barriers as hESCs regarding IPR issues (patents) and exploitation of these patents, and these IPR issues regarding hiPSCs may be more detrimental than these faced by hESC or IPR patents. An important question is, do these hiPSCs really have the so-called 'natural potential'? Answering this question will help determine how hiPSC technology will contribute to hESC technology and subsequently to human well- being or whether or not there are any morally significant differences between hiPSCs and hESCs (Sugarman 2008, p.3). Solomon, Sandra & Brockman-Lee (2008, p. 4) say that "since 2005 and even earlier, there has been a concern that hiPSCs could be reprogrammed back **'**to the point of yielding a totipotent cell-in effect a cloned human zygote*'"*. This (if found to be true) would mean that a viable embryo could be obtained from hiPSCs using tetraploid complementation in the same way they can be obtained from ESCs. "Meaning that iPSCs

could potentially be used for reproductive cloning (of course hypothetically speaking reproductive cloning is illegal) and so find itself being entangled in the same ethical aspect as those of the hESC debate" (Watt & Kobayashi 2010, p. 21).

The question is "whether or not these reprogrammed somatic cells can be reverted back into a condition (pluripotency) whereby they can develop into several different types of cells, including oocyte or sperm" (Obasogie & Theung 2012, p. 54). Consequently, Obasogie & Theung (2012, p. 54) seem to agree and report on this. In addition, Sugarman (2008, p. 4) says that "direct reprogramming of iPSCs does initiate a cellular process and that given the appropriate supportive intervention and the right circumstances it will have the biological capacity to generate an organism intrinsically capable of developing into a fetus. Furthermore, with additional DNA reprogramming, scientists can move the cells from pluripotent status to totipotent and turn the iPSC into an embryo which once implanted can lead to pregnancy and birth". However, this would be with some iPSCs and not with all, depending on the starting material i.e. somatic tissue samples. Recently two animal experiments have demonstrated that reprogrammed mice cells can in fact give rise to an entirely new organism from somatic cells. These experiments were conducted by two separate teams in 2009, although they have not been performed with humans. Obasogie & Theung explain this process, that by "using somatic cells taken from the skin of adult mice, the researchers used a virus to inject four genes into mice cells, which reprogrammed the cells to a state of pluripotency, causing them to exhibit the same plasticity as embryonic stem cells. They were then implanted in acellular surrounding material of a nonviable "tetraploid" embryo that had its own cells modified; the new embryo with the reprogrammed somatic cell which then developed into new baby mice" (Obasogie & Theung 2012, p. 54).

It can therefore be argued that if hESCs have a special moral status because of their ability and potential to develop into a human being, iPSC seems to also contribute to the same potentiality argument (based on the above mice experiment) therefore, consistency would require that they too, should have the same special moral status (Sugarman 2008, p. 4). This would mean that somatic tissue samples such as skin, hair follicles, spleen etc., should contain the same moral status for human research (especially if harvested and used for hiPSC lines) as those of embryo used for hESC research because every somatic cell would have the potential for human life. Thus, hiPSC research would not have resolved the ethical issues regarding moral status of the embryo and therefore would also contribute to the same 'special' ethical issues raised by hESCs concerning the moral status of the embryo. Moreover, in order for this research to move forward, human embryos are still required for comparison, evaluation and as a standard, and because of this, hiPSCs still require the destruction of human embryo in order to bring this technology into its 'perfection', in addition to the moral status and its (somatic cells) potential to develop into a human being under the right conditions. Additionally, many patents (*Moore v. Regent of University of California and Greenberg v. Miami Children's Hospital Research Institution*) have been granted based on the fact that participants or donors do not have any property or ownership right and interest in their own tissue sample. However, these court decisions and arguments were never on the ground that the individual's tissue sample has a 'potential for human life' such as cases with oocyte or sperm or embryo donations. Examples of such cases where donors (alive and deceased) were legally seen as having a right to their own tissue sample were those who either donated frozen embryo or oocyte or sperm.

Cases such as those of *Davis v. Davis* (842S.W.2d588, 1992) and *Davis, Hecht v. Superior Court* (50. Cal. App 4th 1289, 1292, 1996), both won property rights over their tissue samples

as the court viewed either the embryo, oocyte or sperm as not being like any other human tissue because it has a 'genetic material' that can be used for reproduction (Obasogie & Theung 2012, p. 62), i.e. potential to have human life. The court in the above cases valued either the embryo or oocyte or sperm above that of somatic cells and this value lay in the potential to create a human being. However, these somatic cells theoretically and with the two animal experiments have indicated that iPSC technology has the potential to create (in the right conditions) embryos and therefore be used for reproductive purposes. Therefore property or ownership rights concerning somatic cells and the mice experiments in hiPSC technology would have to be discussed further and in depth as those cells have the same 'moral status' as those of hESC technology if they can produce embryo or life through fertilisation. Therefore, it would mean that the same property rights that pertain to embryo, oocyte and sperm should also be given to somatic cells i.e. those used for hiPSC research and therapy.

Despite the misconception that iPSC have little to no 'special' ethical issues and would solve some of the ethical issues raised by hESC, we see that hiPSC has its own hurdles such as technical, clinical, manufacturing, regulatory, as well as ethical issues that need to be discussed and resolved. The human embryo's special moral status based on the embryo's potential to develop into a human being has been the general consensus concerning this technology. However the same concerns regarding the moral status seem not to have been resolved by hiPSCs except that there is an additional ethical concern as to whether the embryo that will be 'produced' or 'created' by hiPSCs will have the same or different 'moral status' as those created by hESCs or not.

3.6 CONCLUSION

"hiPSCs are similar to hESCs in terms of their morphology, feeder dependence, surface marker expression and *in vivo* teratoma formation capacity" (Narsinh, Plew & Wu 2011, p. 636). "There are also reports of their variability in the *in vitro* differentiation potential such as functional and molecular equivalence and hiPSCs originality of the somatic cell shows an epigenetic memory that indicates gene expression differences" (Solomon, Sandra & Brockman-Lee 2008, p. 4). Despite the many similarities between hiPSCs and hESCs there are some notable and vital differences. Therefore years of research work are still required to establish the extent of both the similarities and differences between hESCs and hiPSCs. Solomon, Sandra & Brockman-Lee (2008, p. 4) further explain that "at the very least, hESCs are needed as a positive control which will be used to compare the new hiPSCs, as it still remains whether reprogrammed somatic cell differ significantly from the embryonic stem cell or not. Furthermore, hESCs are the only genetically unmodified pluripotent stem cell available at this time", possibly for a much longer time and for this reason they will still be needed and if not in research and therapy, then as a standard for these stem cell alternatives.

In addition, "the most contested differences between hESC and hiPSC cell-based therapies include safety, treatment efficacy, accessibility to large numbers of patients and ethical controversies which are ethically relevant in the light of the different value premises and endorsement by different types of ethical theories" (Sugarman 2008, p.5). Ethical issues posed by both hESCs and hiPSCs are those of IPR (in a form of 'patents of life') and exploitation of these 'patents of life' which need to be carefully examined before any decision for any prohibitions of either one of these technologies (of course hESC technology)

are made. Thus, so far hiPSC technology has shown to have similarities to hESC, similarities that as noted through the animal experiments have proven to extend to reproductive or creation of animal (mouse) embryo. Therefore, this indicates that the critical ethical issues raised by hESCs are not yet resolved by hiPSCs. Human iPSC ethical issues need to be properly assessed and examined in depth without any comparison to hESC technology as hiPSC brings its own ethical issues or which are slightly different. Furthermore, one can conclude that this technology can only be regarded as a suitable hESC alternative once it shows indications and signs that it has solved the oocyte donation and availability issues and further resolved the underlying IPR (in a form of 'patents of life') issues and the requirements of human embryo as its standard. Moreover, if hiPSC therapies will become affordable and accessible thereby promoting equity and justice.

In conclusion, ASC has been shown to have limitations as an alternative technology to hESC. Despite having lesser ethical issues and concerns, there are technical concerns which seem to make this technology an unsuitable alternative to hESC and more so because ASCs are multipotent and not pluripotent, whereas hiPSCs are pluripotent. However due to technical, manufacturing, clinical application and ethical issues, hiPSC does not seem to be a suitable alternative versus hESC at this moment. Both hESC and hiPSC seem to raise similar ethical issues and concerns that need to be addressed and resolved. However, my opinion is that both types of stem cell technology should be used and researched upon without preferences for one type of technology to the others. Since the starting materials or sources are not the same, we can never be certain about the similarities, especially on long term usage (clinically). Therefore, hiPSCs may have the same pluripotency as hESCs, however this technology cannot replace hESCs as it has its own hurdles and ethical issues and concerns which do not resolve those 'created' by hESCs. So, both hESC alternatives and hESCs should be studied

and used to bring effective clinical therapies, as one alternative proves to be more prominent with certain diseases than the other alternative for hESCs. Both these options can bring a balance in research and therapeutic studies, respectively. Therefore, both hESCs and hiPSCs need to be used together to complement each other with both technologies requiring a lot of research work, improvement in the techniques used and clinical trials before any decisions, judgments and appropriate policies and regulations are made.

CHAPTER 4: ARGUMENT FOR HUMAN EMBRYONIC STEM CELL PATENTS

4.1 INTRODUCTION

Moral issues concerning hESC patents are just as important for discussion, analysis and addressing as those issues regarding the moral status of the human embryo and its use for research and therapeutic purposes. Understanding the dynamics of hESC patents and how morality of these patents may be viewed is vital in order to develop and grow this technology, and to be able to create policies and a legal framework that will facilitate such growth and development. Therefore, in determining the morality of hESC patents an individual will have to separate the ethical issues surrounding this technology, i.e. moral status of the human embryo, from ethical issues that specifically are related to matters of hESC patents such as issues of ownership rights and commodification of these patents. Even though such a separation may be hard in order to deal and address matters concerning morality of hESC patents and in fairness, individuals will have to set aside their own beliefs about whether or not it is morally acceptable to harvest and use human embryo for research and therapeutic. Thus, the moral status of the embryo should not be the determining factor for whether or not hESC patent are moral or immoral acceptable.

Therefore, in this section I will analyse and address matters that pertain to the morality of hESC patents and discuss them through the principle of Ubuntu. I am aware that such issues will not differ so much from those of other biotechnology patents but I will only focus on

specific issues that pertain to hESC patents, since its starting biological material consist of many moral issues than many other biotechnology biological materials that do not have ethical controversies concerning their moral status. I will consider whether hESC patents are morally acceptable or not under the principle of Ubuntu and how these patents may be perceived within an African context.

4.2 MORALITY OF HUMAN EMBRYONIC STEM CELL PATENTS

The status of the embryo debates are closely intertwined with the therapeutic promise that hESC research holds, with most of these debates being repeatedly constructed around the moral status of human embryo. Rubin (2008, p. 20) explains that "public debates on hESC research have been repeatedly construed as an 'abstract moral dilemma', within which the 'good' stands opposed: the dignity of the incurable ill, whose life might be saved by stem cell therapy, versus the protection of the dignity of the embryo, as a potential human existence". He (2008, p. 20) further notes that even though the "ethical dissent on the status of the human embryo is not solved and likewise the ethical dilemma remains, therapeutic promise is reinforced". Therefore, it is inevitable that issues concerning hESC patents will follow even with these 'unresolved' issues regarding the moral status of the human embryo. As a result, research on stem cell lines (those that have been previously approved by the Bush administration) has opened doors for the possibility of these therapeutic promises with some clinical trials being approved by the Food and Drug Administration (FDA). For example there are clinical trials for disorders such as stargardt and dry AMD (from hESC-derived

RPE-MA09hRPE) both by Ocata Therapeutics in the United States of America (USA) as well as clinical trials of the same product licence by the same company under CHABiotech in Korea for the same disorders in Korea, also in the United Kingdom under Pfizer and in Israel under Cell Cure Neuroscience. Additionally, in France a company called Assistance publique, Hôpitaux de Paris is recruiting for clinical trials using hESC-derived CD 15+ISL-1+ cardiac progenitors for severe heart failure and Viacyte in the USA is recruiting for Type 1 diabetes using hESC-derived pancreatic endoderm (VC-01) (Kimbrel & Lanza 2015, p. 681-692). All these clinical trials from hESC technology indicate that this technology is now moving from bench top to therapies and this brings forth a critical ethical issue regarding hESC research and therapy; that of Intellectual Property Rights (IPR), i.e. patents.

Once research on hESCs has been conducted, therapies may be developed and established and the investors behind these research projects and developments will expect some returns and/or financial profit. In order to secure their economic gain, these investors will seek IPR over their work and investments in the form of patents. The morality of these patents is often questioned as is the ownership of the inventions from this technology. Who holds the property rights over the embryo (i.e. the technology or cell lines or data from a particular embryo) once a patent has been granted? This is one of the many questions that may give rise to ethical issues regarding the "moral status" of hESC patents. Human ESCs are already perceived as being unethical and immoral by some, thus the morality issues of patents and issues of ownership of the embryo will only exacerbate the ethical issues surrounding hESC research and therapy.

Biotechnology patents (i.e. 'patents of life' or biopatents- these will be referred as biopatents) resulting from the use of human biological materials in research and development work have been the basis of discussions on many legal cases from the past (more cases are discussed in Chapter 3 and 6). Unless these patents are granted to these biotechnology companies (seeking property protection), many believe that this will halt research and scientific progress, with this being opposite to what the patent system was created for, that is to promote innovation and allow returns of new beneficial results to serve society (Soini, Aymé & Matthijs 2008, p. 10). Soini, Aymé & Matthijs (2008, p.10) further make a statement that "some of these patents block downstream research and development as well as hinder patients' access to recently available diagnostic tests, i.e. health and healthcare access". Despite both the above views, biopatents have been objected to on the grounds that they 'patent life', with 'sanctity of life' arguments being made that these patents violate human dignity and respect for persons and use human beings as commodities. Further arguments are that these biopatents will taint the perception that people have about themselves. If human life is to be respected based on its intrinsic value, these patents would be using human beings as *mere* means to an end and thereby degrading human dignity and respect. One can only imagine how hESC patents will be perceived especially by those who use 'sanctity of life' arguments against the harvesting and use of human embryos for research and therapies. In addition, the novelty and nature of invention of these biopatents have been questioned because they relate to materials that already exist in nature (Soini, Aymé, & Matthijs 2008, p. 16). Therefore, this will only make the idea of human embryos being patented and just like with any other human biological material, is in contradiction with many people's sense of justice, morality and reality or with the perception of human dignity and common interest.

Hence, the question of whether the isolation of naturally occurring things is patentable (the patentability of natural subject matters) or not is relevant to stem cell research, i.e. hESCs. This includes the forbidding and/ or prohibition of these patents from inventions of 'naturally' occurring material, which would not be a solution as this may halt or block important research and development of therapies. Since 1980 the Supreme Court of the United States opened the gates to patenting of natural occurring living substances with its discussion in the *Diamond v Chakrabarty*, 447US303 (1980) case. Now, "virtually any living thing that can be reproduced or altered by human intervention can be patentable" (Knowles 2007, p. 2), including human embryos. Therefore, hESC patents are legally acceptable in the United States. However ethical concerns regarding the morality of these issues have not been critically evaluated and addressed and it is important that this is done before hESC technology starts to grow beyond what it is. Although the morality of these hESC patents may be questionable, a distinction needs to be made between the moral status of the source (human embryo) and the morality of the patent. The moral status or how the human embryo is perceived should not cloud our judgment over the morality of the inventions obtained from this technology and the patents themselves. Additionally, ownership rights of the patents should be understood in terms of the patent holder not having ownership over the embryo or the donor(s) themselves, but having legal ownership rights over the information obtained from that source as this matter may add to the ethical issues regarding hESC patents and how it is viewed. Related matters of incentives received by the patent holder(s) and royalty fees pertaining from commercial exploitation of these patents may also exacerbate the ethical issues of these patents, making it necessary to address the morality of hESC patents beforehand as such issues also add to issues relating to public morality. Thus, it is not only important to address issues concerning public morality but also those that may cause unnecessary prohibitions in the future, as this may also be an immoral act on our part, issues

such as what may be classified as a patentable subject matter, manufacturing process and so forth, related to hESC patents.

What is important concerning hESC patents system is the maintenance of fundamental human values and rights which will help to safeguard human dignity, and integrity of persons (Soini, Aymé & Matthijs 2008, p. 16) resulting in justice. Therefore, morality of hESC patents should not only be based on the issues of ownership rights and commodification but also on the four patent criteria as well as basis for granting and revoking patents in general. Of importance is how these patents will be commercially exploited as this may result in use or applications that may or may not promote dignity, respect, integrity and justice thus making these patent immoral, unethical and unacceptable. In order to address the morality of hESC patent I will focus only on ownership and commodification matters for this chapter, and in the later chapter will address matters of *ordre public* and morality in details.

4.3 MORALITY OF HESC PATENTS AND UBUNTU

Since, the *Diamond v Chakrabarty* case ensured that biopatents are legally acceptable and that any biotechnology invention may be patented with inclusion to hESC lines. However, even with this being the case, there is still a feeling that these patents are against people's sense of dignity, justice and morality because of the sacredness of life viewed by many, therefore with biopatents been regarded as using human beings as *mere* means to an end, an end which is to profit only the patent holders at the expense of others. Making the morality of

these patents an ethical issues that has unfortunately not been given full attention and well addressed, more especially concerning matters of ‘ownership’ and commodification. Thus with the term ‘ownership’ seemingly being understood differently by those who are in law as well as a layman. With the layman’s understanding possibly being that since the patent holder has ownershipof the biological sample they also own the human being from which the biological sample comes from and not legal rights to the information emanating from that particular biological entity. hESC patents are legal based on the patent criteria; novelty, inventive step and industrial application, whereas in countries where the moral clause is also a criterion to either grant or revoke a patent the morality of such patents is not been fully addressed. Apart from European Union countries, even then the morality clause is not used based on the “moral status” of patents itself but seemingly of the entity, human embryo. I will later address issues concerning public morality in Chapter 6. Issues such as ownership rights may exacerbates morality issues of these biopatents and therefore it will have to be normatively analysed in depth especially on what and how Africans perceive hESC patents based the principle of Ubuntu.

du Toit (2005, p. 849) mentions that “in Africa, technology still has a human face” which must be integrated with people’s beliefs, customs, values and social life. Moreover, in the past the general feeling by many Africans versus that of the presence of high technology, such as, “mining and industrial activities, and so on, is that it has not improved their lives or significantly reduced poverty”. This is an issue especially when looking at cases such as those involving mine workers e.g. the Marikana case. The Marikana case or the Marikana protest as it was called was a protest by “Lonmin mine workers in the Marikana area which resulted in a confrontation between miners and police leading to the killing of at least 47 miners. This strike occurred against the protest from the local community in relation to the

preferential treatment of migrant workers. This strike was based on the growing dissatisfaction with NUM (National Union of Mineworkers) who were seen to be siding with management in wage negotiations on behalf of the miners and the rejection of established collective bargaining processes that were perceived by the union rank and file to be outdated and not meeting their aspirations. To add to the miners grievances, the miners were growing disparity in earning between management and workers dissatisfaction with squalid living and working conditions and the migrant labour system" (Cavvadas & Mitchell 2012, p 1). This protest was somehow a realisation that the mining industry has not bought the desired and expected changes for the communities and this is a history that biotechnology companies would not want to repeat but would rather avoid and learn from such industries and outcomes. Cases such as the Mirakana case indicate that there is a need for addressing morality issues when it comes to mining and science and technology as a whole, as these issues may have a great impact on the growth and development of technologies. Hence, he (du Toit) further explains that "with science becoming part of the cultural fibre of society, it does not purport to provide a framework with which an entire culture could be integrated". It is often left to philosophy and religion, for which Ubuntu is regarded as both, to provide such a framework which indicates what is regarded as right or wrong, basically morally acceptable or not, and affects science (du Toit 2005, p. 849). Ubuntu as a concept that is defined as *'umuntu ngumuntungabany' abantu'*, with personhood (Ubuntu) been defined through other persons and not through technology (or science) (du Toit 2005, p. 853). However, technology plays a pivotal role in ensuring that individuals within a community are able to live to their fullest potential and be able to exhibit and display Ubuntu towards one another. Thus, technology has to be used in a manner that will benefit society as a whole and not just Biotechnology Companies or researchers or institution and additionally must not dehumanise, devalue and disrespect that communities cultural values for it to be acceptable. Thereby,

bringing significant changes within those communities in which the community members will be able to benefit and flourish.

Based on this principle (Ubuntu) technology or ownership of this technology does not belong to individuals but to the community- more especially if the community or members of community were involved in making that technology a reality through altruistic donations, and hence neither do patents in this regard. Therefore, the idea of 'ownership' rights may be challenging for many Africans to grasp (by this I mean those mostly from rural communities) as values of Ubuntu are much more evident than in most urban areas of SA and I am speaking from my own perception and what I see, especially that of natural occurring things or ecology or biological material. Even though this principle allows human embryo to be harvested for research and therapeutic purposes, it does not follow that hESC patents are morally acceptable. Since Ubuntu puts a lot of emphasis on common good, solidarity activity and communion of persons rather than their autonomy (autonomy in the sense of company or institution or researchers having or being granted sole ownership of the hESC patents) if an individual has 'ownership' rights of something that was based on collective effort that will be viewed as immoral and unethical. Thus, if anything even if it is a granting of a patent is seen contrary to promoting and maintaining communities' unity, collectiveness, harmony, solidarity, dignity and respect, thus it will be regarded as immoral and unethical.

Additionally, all natural occurring entities with inclusion of the human embryo (and more especially the human embryo), contain *seriti* which is the life force that is respected and is not be owned by anyone. Whatever human material or tissue or entity used from an individual who is part of a community connects that individual with his/ her community

through *seriti* and should therefore be used for the good, welfare and wellbeing of that community and not for the profit of researcher(s) or company or institution. The intentions of donations is not to gain and/ or benefit researchers or companies solely but also for the benefit of the community, and therefore researchers and/ or companies cannot claim ownership rights over it. Because donations are altruistic, these donations are in sense regarded and seen as a duty and responsibility towards that individual's community by that individual. From this concept no one can have 'ownership' rights over that which belongs to all and is a gift to bring changes and better the community and society and because no person can be who they are without other as a saying goes in Zulu *'izandla ziyangezana'*- direct English translation is 'hands wash one another'. Meaning, people help each other there is no individual (including companies) that become successful by themselves or own their own without the help of others along the way. Even though everyone understands each other's role, we all have a part in each other's success and must share in benefits somehow no matter how small they are. No one can own anything because it belongs to all of us we all have part to play no matter how small and insignificant it may seem and based on that understanding individuals within communities understand that. Of course the company and/ or researcher will have the majority of the benefits from it but it does not mean that they own it. Besides, no human being can own that which has *seriti*.

This all stems out from the values and virtues of Ubuntu and understanding and living by them. Therefore, how that particular technology will work and promote Ubuntu is also crucial in maintaining these virtues and values, especially regarding technology that uses biological material that are considered to be of higher value (because they are from human beings) such as a human embryo. From that one then understands that interconnectedness and collectiveness is very important within SA and this has also made all "Africans to learn to

survive through this collective action, mutual care and support, not by individual self-reliance. In order for this degree of mutuality to thrive Africans have developed a collective psyche which allows them to pool resources and communities to work together collectively"… thereby ensuring that "personal interests are less important than those of the community's needs" (Hailey 2008, p. 12). This is a notion that is foreign to patent holders as the patent system is not based on this type of collectiveness and thus hESC patent ownership rights may be viewed as the patent holder's way of promoting their own self-reliance and owning that which belongs to the community. Hence this being viewed as unethical and not promoting the values of collectiveness and virtues of Ubuntu for one's community, which may result in disharmony.

Therefore, for hESC patent to be morally acceptable, it would mean that collective efforts should be put in place for participants and/or communities as well as patent holders alike. This research should not be about the researcher, or biotechnology companies or institution's interest alone but should be based on broader specification and that including the communities' needs and wants as well. Researchers and/or other stakeholders involved have to understand that in order for this technology to thrive and blossom it will take a collective effort, one that includes working together with the community. In preserving morality of hESC patents, feedback on how their biological material was used may be needed to be communicated with the communities involved, as this shows respect and gratitude. Moreover, it also shows that unity and interconnectedness as community members will be given an opportunity to know and be part of how their participation helped and what inventions were developed and how they will bring benefit not only to them but globally. In a way community's incentive from hESC patents don't have to come through profits as simple communication can be the answer and a way of showing Ubuntu on part of the patent holders

and stakeholders involved. (I will further discuss on benefit-sharing issues later in Chapter 6) Working collectively between research(s) and individual(s) with their communities is all part of Ubuntu. This can make communities realise that they were not being used as *mere* means to the company's or researcher's end but their contribution and effort is valued.

In order to emphasize on what I have mentioned already, Ubuntu promotes the "building of collective understanding through sharing of ideas between local and global community members, building on the idea that ideas are not properties that can be owned by individuals, but instead, a common resource that should be shared willingly" (Hailey 2008, p. 12). In addition, this notion is also extended from ideas to environment such as oceans, plants, animals, land [8]etc. This same concept can then be extended concerning any human biological materials or naturally occurring entities requested to be used for research and development. Because of the interconnectedness and the collectiveness, we are all connected to each other in a community. '*I am because we are*' is so much more than just a sense of moral personhood, but also biological as well through *seriti*. Therefore, that which is from an individual belongs not only to that individual but also to his/her family and community (genetic/geographic/racial etc.) as it is regarded as a common resource. According to the African culture, there is no child that is an orphan because that child would have parents (even though not biological), family members or extended families playing the role of

[8] Concerning land one should into consideration what Hailey (2008, p. 12) says regarding ideas being a common resource and extend that notion to land. Thus, land is also regarded as a common resource and as well as the speech by Former S.A President Thabo Mbeki called 'I AM an African' on how the mountains and the lands and the oceans are one with us, that an individual is part of the land and so forth and that that land is also part of that individual too, because we are all interconnected through *seriti* and therefore just like with the ocean, or animals or plants thus the land cannot belong to an individual as such. Land can be shared amongst individuals and individuals may have stewardship over the land but not ownership as such, a concept found in rural communities and of course this concept usually does not extend to 'private' land.

parenthood, neither does anyone own land, land belongs to all as well as that which comes natural with it. This all forming part of the common resource.

The idea of ownership rights for these biopatents would be considered immoral and unethical and not possessing or displaying Ubuntu. Human materials, tissues, and entities are common resources that should be shared and used collectively for the good of the community without any individual having any ownership and rights of such resources. Thus, the notion that human embryos or any information may be owned by researchers or company or state, excluding the participant or donor as well as his/her community will pose serious sense of disrespect, dehumanising and social disharmony for South Africans. Therefore, hESC patents will be viewed as unethical and immoral based on those moral grounds as they do not support the collectiveness and sharing of common resources as Ubuntu requires to maintain and develop. Common resources and information emanating from them are not properties to be owned by individuals, but owned by the entire community (family, extended, and even global families). Therefore, in order to resolve and come up with solutions and resolution concerning the morality of hESC patents that will be viewed as portraying Ubuntu, the Government will have to establish a system in place that will not only include the researchers, companies and the government but also the participants and their communities so that everyone shares in the benefits of these patents and the patents maintain social harmony. This will be a system that will display values of Ubuntu through its legal regime by promoting the wellbeing and wellness of the community through public healthcare and improve (significantly so) the communities' life in other means and areas. Apart from this, certain usage of terms such as 'ownership' rights may need to be replaced with 'stewardship' rights, as this will give a sense that the patent holder is the custodian of their biological material and will use or work the patents in a manner that will benefit society as it will be for their interest.

Thereby, by applying the principle of stewardship within hESC patent system will bring back the trust not only to this particular technology but to other technologies in Africa, trust which has been lost.

4.5 CONCLUSION

In conclusion, African views regard the human embryo as a common entity and therefore, a common resource that does not belong to an individual, but to the entire community and this will include the information pertaining to it. Because of this hESC patents will have to work for the benefit of the community and this can be facilitated by the patent laws which can ensure that the wellbeing of individuals and/ or the communities will be maintained. Thus, by also promoting and ensuring that values of Ubuntu are maintained through this technology which will ensure that care, solidarity, health and harmony to mention just a few are realised through the patent system. It is crucial that South African laws, regulations and professional guidelines display values of Ubuntu in order for them to be ethical sound and morally justifiable especially in a South African context (with inclusion to Africans as whole). Thus, the laws and regulations and professional guidelines should not be seen (even by default) to be favouring other stem cell alternatives but should provide and facilitate an environment for hESC research and therapy as well because of its possible health and healthcare benefits. Moreover, because these other alternatives have also shown (referring to Chapter 3) to have technical, clinical, Intellectual Property Right (i.e. patent) and ethical issues, amongst others such as legislations and regulation and prices, that still need to be dealt with. These laws,

regulations and professional guidelines should be implemented in a way that will promote Ubuntu within South Africa.

CHAPTER 5: SOUTH AFRICAN LEGAL FRAMEWORK REGARDING HUMAN EMBRYONIC STEM CELL

5.1 INTRODUCTION

Scientific research, especially in the form of stem cell research, has progressed rapidly and like many other countries, the South African legal and regulatory structures in place have struggled to keep up. The South African laws and regulations have previously been reported by some scholars (Nortjè 2007 & Prinsen 2010) to have certain loopholes concerning stem cell research and therapies, i.e. hESC research and therapy. For the past decade or more, hESC research technology has witnessed not only extraordinary scientific developments, but also a process of consultative and deliberate regulatory reform, especially in relation to aspects of the use of the human embryo (Then 2009. p, 13) for the purpose of hESC research and therapy on an international level.

In order to have an insight on the legal framework of hESC research and therapy that South Africa has adopted I will analyse the position that it has taken concerning this technology. This will give an insight and indication as to how research and therapies in this area are approached legally, and whether or not the legislation, regulations and professional guidelines are morally acceptable. For this Chapter I will focus on the legal aspect, regulations and professional guidelines with inclusion of the constitutional rights of the human embryo.

5.2 CONSTITUTIONAL RIGHTS AND HUMAN EMBRYO RESEARCH

Since the Constitution is the supreme law of South Africa I will begin by analysing if the human embryo has any constitutional rights. This will provide insight into the position of the embryo and how the laws, regulations and professional guidelines have addressed hESC research and therapy and thus created an environment for this technology. Moreover, as Prinsen (2010. P, 47) stipulates, "the obligations imposed by the Constitution must be adhered to and any legislation or conduct which is inconsistent there with is invalid". Therefore, in the context of hESC research certain fundamental rights which are constitutionally protected become relevant, as those rights may be violated or limited. "The limitation clause (section 36) of the Constitution is of importance as it is imperative to determine whether an infringement upon fundamental rights could nevertheless be justified" (Prinsen 2010. p, 47-48). In so doing, one determines whether or not hESC research and therapy are constitutionally valid. There are reports on how, in the past, the Constitution has provided many people, entities and actions which were previously considered illegal with the right to be legalized, and those which previously had no voice were given one (Nortjè 2007. p, 57).

According to the limitation clause, 36. "(1) The rights in the Bill of Rights may be limited only in terms of the law of general application, to the extent that the limitation is reasonable and justifiable in an open and democratic society based on human dignity, equality and freedom, taking into account all relevant factors, including— (a) the nature of the right (b) the importance of the purpose of the limitation (c) the nature and extent of the limitation (d) the relationship between the limitation and its purpose and (e) the least restrictive means to

achieve the purpose. (2) Except as provided in subsection (1) or in any other provision of the Constitution, no law may limit any right entrenched in the Bill of Rights". This limitation (for example to limit an individual or company with respect to research, healthcare and therapies or donating biological material,) can only be constitutionally valid if and when it can be reasonable and justified in an open and democratic society based on human dignity, equality and freedom. However, this limitation clause is weighed against a balance which must exist between the purpose of the limitation and the limitation itself, and hence the limitation must therefore be legitimate. Rautenbach (2014, p. 2231-2232) explains this balancing act as follows: "balancing is not undertaken to find a compromise with which the combatants are equally satisfied or dissatisfied. It usually means weighing conflicts, rights and interests in order to determine who should win". In this case, balance would determine the rights and interests of those who are sick and how hESC technology can bring harm versus benefit to public healthcare. Furthermore, "in the balancing process, the relevant consideration will include that the nature of the rights is limited, the purpose for which it is limited and the importance of that purpose to such a society, the extent of the limitation, its efficacy and particularly, where the limitation has been necessary, whether the desired ends could reasonably be achieved through other means less damaging to the right in question" (Prinsen 2010. p, 52 and Rautenbach 2014. P, 2239). The State has a duty to give reasons for the limitation and to justify any infringement of rights and this should be done openly and traceably (Rautenbach 2014, p. 2235). Therefore, hESC technology should only be deemed invalid, and therefore not be permitted to proceed, if there is a strong and justifiable reason to believe it would be a violation of human dignity, equality and freedom; a decision that must be reached through the concept of process. Against this background I will look at some of the constitutional 'rights' of the human embryo as an entity, or a source for research and therapy, which may be based on arguments concerning the moral status the embryo.

5.2.1 Section 11: The Right to Life

Section 11 of the Constitution protects the right to life and to be more precise, the right to human life. This section states that "Everyone has the right to life". The question that should be asked concerning hESC research and therapies is, what does this mean for hESC technology? Does the human embryo have the right to life and is it protected by this clause? If so, then the use of a human embryo for research and therapy would be a violation of its right to life. The issue that a human embryo is or is not a person seems to be the most important ethical issue, and possibly an equally important legal issue. As mentioned before in Chapter 2, the embryo is not regarded as a 'fully developed' human being based on both Western philosophy and Ubuntu, but this discussion considers the use and harvesting of a human embryo for the purpose of research and therapy only. It remains important to analyse whether the human embryo has the right to life legally before analysing the South African legislation and regulations regarding hESC research and therapy. Granting the embryo Constitutional rights would therefore mean that the embryo should not be used for any research or therapeutic purpose due to the right to life and the State's obligation to protect this right. In terms of the Choice on Termination of Pregnancy Act, 92 of 1996 (Amended 2008), a foetus may be terminated at up to 12 weeks of pregnancy on request, and even after this, subject to specific conditions. At this stage, a foetus is much more developed than an embryo. This suggests that the human embryo does not possess a constitutional right to life or is protected by Section 11 of the Constitution. This would mean that in terms of the Constitution the embryo has no legal status and there is therefore no constitutional impedement (based on a right to life) to its being harvested for research and therapeutic purposes; no infringement of the right to life can occur where the subject does not possess the right.

5.2.2 Section 10: Human Dignity

Human dignity is of paramount importance to most scholars who oppose hESC research and therapy. They have argued that the instrumentilisation of the human embryo violates the right to dignity. Section 10 states that "Everyone has inherent dignity and the right to have their dignity respected and protected"... 'everyone' here would implying a human being or as explained by Prinsen (2010. p, 62) people or person, and this does not imply human embryo that is still to develop and be born to become a 'fully developed' person. Therefore, harvesting and destruction of human embryo for hESC research and therapy does not violate this right being that it would have to be alive or be born first for its dignity to be violated.

In conclusion, the Constitution is vital for the interpretation of the law, regulations and professional guidelines. The human embryo does not have any legal status in terms of the Constitution and is therefore not protected by section 11, which means there is no constitutional empdeiment for it to be harvested for hESC research and therapy. In terms of section 36 and the limitations created therefrom, not all rights are absolute, and it is my submission that this applies to hESC research and therapy. Though the human embryo may have no constitutional protection, the protection of the donors, participants and patients is vital, as part of their constitutional rights. In the following sections I will analyse all the laws, regulations and guidelines concerning hESC research and therapy.

Next I will analyze and discuss the Regulation Relating to Artificial Fertilization of Persons (No. 1165 of 30 September 2016), regarding *in-vitro* fertilization (IVF) and how it deals and

address issues regarding hESC research and therapies.

5.3 REGULATIONS RELATING TO ARTIFICIAL FERTILISATION OF PERSONS (No. 1165 of 30 September 2016)

Regulations Relating to Artificial Fertilisation of Persons of 2016 (No. 1165) addresses issues that are related and concern *in-vitro* fertilisation and consists of 23 Articles. (Although these regulations have been gazetted for comments and have not yet been finalized, I will review them for this study, since it may be interesting and beneficial to do so). This Regulation ensures and regulates donations of gametes from living persons, applications for authorisation, and individuals who can apply for such authorisation. It therefore addresses all the requirements and qualifications of persons who may be given authorisation, and stating that such individuals should be registered with the HPCSA. This is particularly important especially considering IVF embryos may be used for hESC cultivation, while there Regulations do not specifically regulate the use of the human embryo and gametes for hESC research and therapy, certain Articles could be applicable to hESC. They include: Article 4 'Removal and withdrawal storage of gametes', Article 5 'Composition in respect of the withdrawal or removal of gametes', this section could have made provision for the compensation of couples who may consent to the use of their 'fresh embryo' for hESC research and therapy. Article 7 'Restriction on donation of gametes' could have also included what restriction within IVF are placed for use of embryo or gametes used for research and therapeutic purposes. The same could have been done for Article 8 'Prerequisite for the

removal or withdrawal of gamete' to include embryos for hESC research and therapy. Article 10 'Control over artificial fertilisation, embryo transfer, storage and destroying of zygotes and embryo' is important for hESC research and therapy. Article 10 (4) (bb) makes provision for zygotes and embryos to be used for other purposes (such as research). Although, embryos which are unclaimed for a period of 10 years should only be destroyed after the owner's consent, thereof there should be an option given to the owner to either donate the embryos for research purposes, thereby applying the waste avoidance principle. This could alleviate the number of embryos needed for research and therapies as well as basic scientific training. Whether or not this is an option that the Minister or Director-General can consent to is not mentioned within the Regulation.

Another article that is relevant and very important to hESC research and therapy is Article 17 (1) which deals with ownership issues related to zygotes and embryos and stipulates that ownership of the male gametes before fertilisation is vested in the male recipient by an authorised institution, and the same applies if fertilisation of the male gametes is towards his spouse. However, ownership of the male gamete after fertilisation will be vested in the authorised institution, while ownership of the female gamete is respectively vested in the female gamete donor. In addition, ownership of a zygote and embryo after fertilisation affected by the male or female donor is vested with the recipient. This section only applies to ownership related issues that pertain to gametes or zygotes or embryos for the use of artificial fertilisation and not specifically for other purposes such as research. This leaves out matters concerning ownership through IPR and Patents regarding gametes or zygotes or embryos for purposes such as research and development of therapies, devices or products. Not only because of that but also because the same Regulation makes provision for embryos, zygotes and gametes to be used for other purposes either than fertilisation and such purposes can also

include hESC research and therapies or developments of therapies. Therefore, it is important that this be dealt with as issues regarding ownership also bring their own set of ethical issues and concerns relating to hESC technology.

Moreover, the Regulation lacks information on the use of embryos or zygotes for other purposes. Apart from the use of left-over zygotes and embryos, provision should also be made for the use of fresh embryos and the creation of embryos for research purposes through IVF procedures. The Regulation Relating to Artificial Fertilisation of Persons does not adequately deal with issues concerning the use and harvesting of gametes and human embryos for the purpose of hESC research and therapy.

Next, I will analyse and discuss the National Health Act (NHA), 2003 (No. 61 of 2003) as a prominent Act that deals with tissue, biological material, blood and blood products with inclusion to stem cells, i.e. hESC.

5.4 NATIONAL HEALTH ACT, 2003 (NO. 61 OF 2003)

In South Africa, hESC research is regulated by Chapter 8 of the NHA, 2003 (No. 61 of 2003) which is supplemented by two regulations, namely; Regulation Relating to the Use of Human Biological Material, and Regulations Regarding The General Control of Human

Bodies, Tissue, Blood, Blood Products & Gametes. I will only analyse Chapter 8 of the Act, as this Chapter deals with and addresses issues concerning stem cells technologies.

Section 55 of the Act states; "A person may not remove tissue, blood, blood product or gametes from the body of another living person for the purpose referred to in section 56 unless it is done – (a) with a written consent of the person from whom the tissue, blood, blood product or gamete are removed granted in the prescribed manner; and (b) in accordance with prescribed condition". Concerning hESC research this section applies to donors of oocytes or sperm or aborted foetus or foetal tissue for the purpose of hESC research, and the removal has to be done with a written consent from the donor, for which it is understandable that these gametes cannot be donated or used without consent from the donor with gamete being defined in The Act as '…either of the two generative cells essential for human reproduction'. This section does not accommodate embryo donations for the purpose of research or therapy. Section 56 (1) of the Act, which is also important for stem cell regulation states that; "A person may use tissue or gametes removed or blood or blood products withdrawn from a living person only for such medical or dental purposes as may be prescribed". This is not broad enough to allow biological materials to be used for research purposes, allowing for only medical or dental purposes, though some may argue that 'medical purposes' include research. In order to solve this, the phrase 'scientific purposes' should be included, or the definition of medical should be expanded to include scientific research.

Moreover, Section 56 (2)(a) states that "Subject to paragraph (b) the following tissue, blood, blood product or gametes may not be removed or withdrawn from a living person for any purpose contemplated in the subsection. Section 56 (2)(a)(iv) placenta, embryonic or foetal

tissue, stem cells and umbilical cord, excluding umbilical cord progenitor cells; and (2)(b) The Minister may authorise the removal or withdrawal of tissue, blood, blood product or gametes contemplated in paragraph (a) and may impose any condition which may be necessary in respect of such removal or withdrawal". Therefore, this section allows the removal of embryonic, foetal tissue and stem cells provided that the Minister's approval is obtained. However, this section does not make it clear whether or not this can be used for research purpose or not, unless this is part of the conditions that needs to be granted by the Minister. Nortjè (2007. p, 56) raises concerns of all the power being vested in to the Minister and says that "this should be subjected to constitutional scrutiny", a sentiment with which I agree, as I fail to understand why this power should be vested in the Minister. This is not required when an individual wants to perform an IVF procedure or terminate a pregnancy; even when the pregnancy is beyond the 12 weeks period, as it is only the doctor that can advise on whether or not one can terminate the pregnancy. The ethical issues and legal issues surrounding IVF, abortion and hESC research and therapy are all similar and stem from the same sources i.e., the 'when does life begin' question amongst others. All these processes deal with ethical and legal issues pertaining to the sanctity and right of life. So why make a special requirement with this technology and not with the other two procedures? I don't think it is necessary to get the Minister's approval in order to conduct research (and even for therapeutic purposes) as long as there is legislation and regulations with professional guidelines in place that the researchers or scientists must follow and adhere to. With that said, there may be a need to implement more specific regulations and professional guidelines or a scientific body like the one for pharmacists and/ or healthcare providers (such as the South African Pharmacy Council) which will make certain that scientific integrity and conduct is adhered to. Such a professional body would stand apart from existing Research Ethics Committees (both on the National, independent and institutional levels) as well as relevent

individuals and/ or bodies whom the Minister has or can devolve all the necessary powers to. Most often the issue is not with obtaining approval from the Minister but rather with whom the Minister devolves powers as provided for in Chapter 12 of the Act under "General Provisions". Thus, Chapter 12, Section 91 titled "Minister may appoint committes" says, "(1) The Minister may, after consultation with the National Health Council, establish such a number of advisory and technical committes as may be necessary to achieve the object of this Act. (2) When establishing an advisory or technical committee, the Minister may determine by notice in the *Gazzette*- (a) its composition, functions and working procedure; (b) in consultation with the Minister of Finance, the terms, conditions, remuneration and allowance applicable to its members; and (c) any incidental matters relating to that advisory or technical committee". Based on this section the Minister may appoint a committee specifically for stem cell research and therapies to. Section 92 titled "Assignment of duties and delegations of powers" says, "Subject to the Public Finace Management Act (Act No. 1 of 1999)- (a) the Minister may assign any duty and delegate any power imposed or conferred upon him or her by this Act, except the power to make regulations, to – (i) any person in the employ of the State; or (ii) any council, board or committee established in terms of this Act; (b) the relevant member of the Executive Council may assign any duty and delegate any power imposed or conferred upon him or her by this Act, excpet by the power to make regulations, or assigned or delegated to him or her by the Minister, to any officer in the relevant provincial department or any council, board or committee established in terms of this Act; (c) the Director-General may assign any duty and delegate any power imposed or conferred upon him or her by this Act to any official in the national department; and (c) the head of a procincial department may assign any duty and delegate any power imposed or conferred upon him or her in terms of this Act to any official of that provincial department". This section may help deal with isues of how the individual and/ or body that has been given the

power by the Minister may be appointed, such as who should be appointed and what power they have. However, with regards to hESC technology it is understandable why there is a need (to some extend) to obtain Minister's approval with certain procedures or methods applied for hESC research and therapy which may have some form of extreme measures and restrictions, but not with all of them- as stipulated in the Act. Hence, decision relating to hESC research and therapy should be assigned to a dedicated body and/ or relevant individuals (that is assigned by the Minister) that will understand not only the legal, but also ethical, social and technical matters partaining to hESC technologies. (How the infrastructucture of these individuals and/ or bodies are regulated and overseen is described in Department of Health (DoH) document titled: "Ethics in Health Research: Principles, Processes and Structures" of 2015, chapter 5 titled "Health Research Ethics Infrastrature"[9]). However, how powers are given to these individuals and/ or body is not stipulated and this needs to be as it is very crucial and must be carefully evaluated as this may also cause stagnation in progress of the technology or take a direction that may not be benefincial for SA.

Section 57 on "Prohibition of reproductive cloning of human beings", which is of paramount importance for the regulation of hESC research and therapy, states that "A person may not- (a) manipulate any genetic material including genetic material of human gametes, zygotes or embryo (b) engage in any activity, including nuclear transfer or embryo splitting for purpose of reproductive cloning in human beings". I submit that the Act should have had a separate section for prohibiting reproductive cloning and then another section that will deal with manipulation of genetic material, zygotes and embryo. Section 57 (2) "The Minister may,

[9] Document can be accessed from: http://www.research.ukzn.ac.za/Libraries/in_Health_Research_Final_A_used.sflb.ashx.

under such conditions as may be prescribed, permit therapuetic cloning utilising adults or umbilical cord stem cells", still grants the Minister all the power concerning therapeutic cloning. However, the conditions under which the Minister can permit this are currently not defined and will need to be included in the Regulations, as provided for in Chapter 11 of the Act. Chapter 11, Section 90 says, "(1) The Minister, after consultation with the National Health Council, may make regulations regarding- (a) anything which may or must be described in terms of this Act; (b) the fees to be paid to public health establishment for health service rendered; (c) the norms and standards for specified types of protective clothing and the use, cleaning and disposal of such clothing; (d) the development of an essential drugs list and medical and other assistive deviced list; (e) human resource development; (f) co-operation and interaction between private health care provider and private health establishment on the one hand and public health care provider and public health establishment on the other; (g) returns, registers, reports, records, documents and forms to be completed and kept by the national department, provincial departments, district health councils, health care providers, private health establishment and public health estalishments; (h) the functions of persons who render voluntary, charitable or similar services in connection with a public health establishment; (i) the rendering of forensic pathology, forensic medicine and related laboratory services, including the provision of medico-legal mortuaries and medico-legal services; (j) communicable disease; (k) notifiable medical conditions; (l) rehabilitation; (m) emergency medical services and emergency medical treatment, both within and outside of health establishments; (n) health nuisances and medical waste; (o) the import and export of pathogenic micro-organism; (p) health laboratory services, including- (i) the classification, accreditation and licensing of health laboratories; and (ii) setting, monitoring and enforcing quality control standards applicable to health laboratories; (q) non-communicable disease; (r) health technology; (s) health research; (t) the national health

information system contemplated in section 74; (u) the process and procedure to be implemented by the Director-General in order to obtain prescribed information from stakeholders relating to health, financing, the pricing of health services, business practices within or involving health establishment, health agencies, health workers and health care provider, and the formats and extend of public interest and for the purpose of improving access to and the effective and efficient utilisation of health services; (v) the process of determination and publication by the Director-General of one or more references price lists for services rendered, procedure performed and consumable and disposable items utilised by categories of health estabishment, health care providers or health workers in the private health sector which may be used- (i) by a medical scheme as a reference to determine its own benefits; and (ii) by health establishment, health care provider or health workers in the private health sector as a reference to determine their own fees. but which are not mandatory; and (w) generally, any other matter which it is necessary or expedient to prescribe in order to implement or administer this Act. (2) The Minister, subject to the Medicine and Related Substance Control Act, 1965 (Act No 101 of 1965), and after consultation with the National Health Research Ethics Council, may make regulations regarding research on human subjects; (3) The Minister may, in any regulation made under this Act- (a) designate as authoritative any methodology, procedure, practice or standard that is recognised as authoritative by international recognised health bodies within the relevant profession; and (b) required any person or body to comply with the designated methodology, procedure, practice or standard. (4)(a) The Minister must publish all regulations proposed to be made under this Act in the Gazzette for comment at least three months before the date conteplated for their commencement. (b) If the Minister alters the draft regulations, as a result of any comment, he or she need not publish those alterations before making the regulations. (c) The Minister may,

if circumstances necessitate the immediate publication of a regulation, publish that regulation without consultation contemplated in paragraph (a)".

Moreover, Section 57(2) excludes embryos, embryonic tissue or foetal tissue as sources to be used for therapeutic cloning, which is unjustifiable especially since using these tissues will not violate the embryo's rights, which of course it does not have. Although, the use of these tissue samples may be included in the Regulations for Stem Cells research and / or therapies. Subsection 57 (4) does allow the use of stem cells and zygotes not exceeding 14 days old within certain conditions, such as the Minister's approval and written consent. Thus, an article published in the South African Journal of Bioethics and Law identifies what is legally permitted by this section of The Act to be used for hESC technology in South Africa. This includes the creation of human embryos for research, including by SCNT, as well as derivation of hESC lines from excess IVF embryos (Slabbert & Pepper 2015, p16). The question therefore is, does this section also include the use of 'fresh embryos' from IVF and not just creation of embryos for research or therapeutic purpose, since 'fresh embryos' can also be created without the embryo exceeding 14 days. Even though, the Act does not prohibit the use of 'fresh embryo' from IVF ethier but maybe there is a need for the Act to be more specific concerning the use of 'fresh embryo' as well. Please refer to Chapter 2 (section 2.2.2, page 27) on what 'fresh embryos' for hESC research and therapies may be since there is a slight difference in both sources for hESC technology. Subsection 57 (6)(b) defines therapeutic cloning, but this definition includes not only adults but also zygote or embryonic cells in its definition, implying that therapeutic means by SCNT are permitted with adult as well as umbilical cord blood. Since SCNT, which uses an adult soma, can be manipulated "to return the genome of the somatic cell to its germ line" (Puri & Nagy 2012. p, 11) unlike with

a somatic cell there is a need for proper clarity in Article 57(2) in order to differentiate between somatic cells for use in ASC and/ or SCNT.

Chapter 8 requires improvement to provide appropriately for stem cell and hESC research, specifically in terms of definitions and theuse of terminology. It needs t expressed with clarity to eliminate ambiguity with relation to hESC research and therapy. It would be better that these lacunae be resloved by devising a new set of regulations that will be specific for hESC technologies and/ or stem cells in general since this has not yet been resolved by the existing regulations. Therefore, utilising some of the lacunae found in Chapter 8 of the NHA, 2003 (No. 61 of 2003), I will now analyse the regulations which supplement this Act and review how these loopholes (concerning hESC) are addressed in order to regulate hESC research and therapy.

5.5 REGULATIONS

Regulations that supplement NHA, 2003 (No. 92 of 2003) include: Regulations Relating To the Use of Human Biological Material of 2012 (as amended 26 April 2017: No. 392); Regulations Regarding the General Control of Human Bodies, Tissue, Blood, Blood Products and Gamete of 2012 (No. R. 180) and Regulations Relating to Stem Cells Banks of 2 March

2012. I will discuss these next, except for the Regulations Relating to Stem Cells Banks of 2 March 2012 as it is outside the scope of this study[10].

5.5.1 Regulations Relating To the Use of Human Biological Material of 2 March 2012 (No. R177)

This Regulation consists of 14 Articles. Article 1 consists of definitions of terms that are used within the Regulations. This section makes provision for new terms not found within the National Health Act of 2003, such as the use and definition of the term 'biological product'. This Regulation defines 'biological product' as "a material from a human being including DNA, RNA, blastomeres, polar bodies, cultured cells, embryos, gamete, progenitor, stem cells, small tissue biopsies and growth factors from the same". It also defines 'embryonic stem cells', as any cell from the 30-200 inner cell mass of the blastocyst. The addition and use of both the above terms will bring better clarity on how hESC can be applied and regulated.

Article 2 titled 'Removal of Human Biological Material', describes who may remove biological material including human embryos for research and therapeutic purposes. Although, this section does not provide a clear indication in terms of hESC research and therapy on a competent person, it is broad enough to indicate who may remove human embryos for research and therapeutic purposes.

[10] Because of the scope of the study it was decided that this would be outside the scope and therefore not to include it

Article 3 ‘Removal or withdrawal of biological sample from living persons’, deals with and addresses matters concerning removal of biological material from the body of a living person, but does not include the human embryo for the purpose of research and therapy. While, Article 4 - ‘Removal of biological material from deceased’, addresses and deals with use of biological material of a deceased person without consent, including where there is evidence that the removal would be contrary to a direction given by the deceased person before his/her death. This section also makes a provision for using biological material (i.e. an embryo) from a deceased person which may be required for research and/ or therapeutic purposes, which would require a letter to the Director-General. Article 5 titled ‘Use of human biological material’ is important to hESC research and therapy as it deals with and addresses issues concerning the use of human biologics for the purpose of any medical/ health research and training as stipulated in Article 5 (b) “Health research referred to in section 69(3) of the Act” & 5 (c) “Training referred to in section 64 (1) (a) of the Act”. Therefore human embryos may be harvested and used for health research and for training purpose. Whether or not training also includes basic scientific research and/or training of personnel or students is unclear, as there is no definition provided for this term within the Regulation.

Article 6 titled ‘Pre-implantation and prenatal testing of sex selection’ does not apply to hESC research and therapy. Article 7 titled ‘Research utilising embryonic stem cells & umbilical cord blood stem cells’ specifically addresses and deals with hESC research apart from umbilical cord blood. This section only regulates the use of excess embryos from IVF. It states: ‘Excess embryos obtained from *in vitro* fertilisation may be used to produce embryonic stem cell lines for the purpose of research, provided that the competent person obtains written informed consent from the embryo donor or cord blood donor’. There is still a need to regulate the creation of embryos by SCNT as section 57 (4) of the Act only regulates

excess IVF embryos, resulting in a confusion in usage of other sources that are allowed by The National Health Act of 2003. Article 8 titled 'Research utilising primordial germ cells' allows the use of primordial germ cells from an aborted foetus to be used for research such hESC with written consent. I will not further discuss this as I do not focus on aborted foetuses as a source for hESC research and therapy. Article 9 titled 'Stem cell therapy utilising adult, embryonic and umbilical cord cells' allow and make provision for the use of human embryo for therapeutic purposes. This regulates the creation of embryos through IVF processes for therapeutic purposes as well.

Article 10 titled 'Use of transgenic cells for stem cell therapy' does not apply to hESC research and therapy. Article 11 titled 'Compensation in respect of withdrawal of human biological material' regulates how donors should be compensated for their donation, as stated in Section 60(4) of The Act. Article 12 titled 'Human biological material registers' requires that there be a register kept for all biological materials by authorised institutions and details should be submitted to the Minister. This is important as establishing an electronic database of all gametes and embryo donations will ensure that there is information on the number of human embryo available for use for hESC research, possibly reducing the number required for research from other donors and making it easier to allocate the embryo(s) required for research and therapeutic purposes. However, what should specifically have been included within this section is the registration of hESC lines for therapeutic purposes, as some of these lines may not be used for both research and therapeutic purposes. Therefore, registration for therapeutic purpose should be mentioned to accommodate solely for that purpose. Article 13 titled 'Storage and control of flow of genetic research information' indirectly applies to hESC research, as some of the research may be for genetic research purposes or genetic information. This section will therefore regulate how genetic information must be kept and

used. Article 13 (g) 'the records are destroyed after the purpose for which they were created have been served', should have made provision for therapies, as information may need to still be kept for a period of time in case of adverse effects from these therapies. The last article of this Regulation, Article 14 titled 'Offences' deals with offences and punishments for persons who may contravene these regulations. The punishment is the same as the one stipulated within the Act, which is a 10 year imprisonment or a fine.

The regulation does make certain provision for the regulation of hESC research and therapies by allowing the use of excess or supernatant IVF embryos for therapies and genetic purposes. However, it would have been better if the regulation also included issues of creation of human embryos for research as well as creation of embryos by SCNT techniques. As it stands it appears as though only excess IVF embryo are permitted for hESC research whereas stem cell from embryos may still be used for therapeutic purposes. This needs further clarity to eliminate any confusion from the legislation, especially since the Act allows creation of human embryos by IVF process as well as by SCNT for research and/ or therapy. Next I will analyse and discuss the Regulations regarding the General Control of Human Bodies, Tissue, Blood, Blood Products and Gametes of 2017 (Amendments).

5.5.2 Regulation Regarding The General Control Of Human Bodies, Tissue, Blood, Blood Products and Gametes: 2 March 2012 (as amended 26 April 2017).

Regulations Regarding The General Control of Human Bodies, Tissue, Blood, Blood Products and Gamets of 2 March 2012, as amended in 11 May 2016 (no. 515) and 26 April

2017 (No. 392) reviewed together for the purpose of this study. Article 1 of the Regulation Regarding the General Control of Human Bodies, Tissue, Blood, Blood Products and Gametes of 2016 (as amended) consists of definitions of terms used and found within the Regulation. Article 2, which is what has been amended, is titled 'Consent for the removal of tissue, gametes and blood from living persons' and is applicable to hESC research and therapy. This article deals with and addresses matters of consent from a living donor and allows donations of gametes from a person older than 18 years old. Of course it is vital in hESC research and therapy that donors understand and are fully informed before they consent to anything. This will ensure donor's safety, security, confidentiality and privacy amongst other things and that their rights are not violated through participation in the research study. The Regulation also allows the use of gametes only for fertilisation or conception. This should have included the use of such gametes for research and therapy as well in order to accommodate hESC research and therapy and to be cohesive with the previous regulation and Chapter 8 of The NHA of 2003.

Furthermore, this Regulation also regulates the institutions and persons permitted to store donated human tissue, blood, blood products and gametes in Article 4(c), "In the case of a gamete(s), to a competent person or authorised institution". The definition of a competent person here is very limited in scope, as the definition of a competent person in Article 1 means, "(a) in the case of the intravenous or intra-arterial withdrawal of blood, a person registered in terms of the Health Professions Act, 1974 or the Nursing Act, 2005 or (b) in the case of finger prick for the withdrawal of a drop of blood for testing purposes, a person authorised in terms of the Regulations Relating to the Withdrawal of Blood from a Living Person for Testing". This definition of both the compentent person as well as biological materials is inadequate, as it does not include gametes or human tissue nor a competent

individual who will be responsible for handling, testing and storing gametes or human tissue that has been donated to the institution, usually a medical scientist. Therefore, the definition that has been used in the previously discussed Regulation could be adopted for this Regulation as well. This definition should not only include competent persons in terms of qualifications, but also responsible persons (such as tranees) within authorised institutions for storing gametes used in research and therapy. Moreover, this regulation addresses and deals with issues of donations and the use of gametes after the donor is deceased (Article 26) but it is vague on the matter and it does not deal comprehensively with future issues. For example, gametes in IVF clinics initially used for conception where the donor has passed are required to be discarded, where instead they may be used for research and therapeutic purposes. Apart from these Article as well as the Article 20, 23, 25 'Offences and penalties', this Regulation does not regulate and focus on hESC research and therapies.

This regulations does not deal adequately with issues concerning 'control' of gametes or even embryos for hESC research and therapies. The focus of this regulation is mainly on tissue, its definition of which does not include embryos or gametes, as well as bodies. This therefore leaves a loophole in terms of how hESC research and therapy is regulated in South Africa. There is a need for appropriate regulations of hESC research and therapy in South Africa and this should not be left for ad hoc interpretation or even self-regulation, rather there should be revisions and changes made to the law. There are many issues that the regulations could have dealt with, for example: the different sources that may be harvested from for hESC research and therapy, issues relating to hESC lines, informed consent, certain provision in which the minister can disapprove a proposal, import and export issues concerning hESC therapies, products and use of hESC data, storage facilities issues and handling of data and embryo, i.e. security matters, how excess to IVF embryos, created embryos by IVF and/ or by SCNT as

well as hESC lines for research and therapy. As it stands there is still a great legal vacuum when it comes to how hESC is regulated in SA. In the following section, I will analyse the normative professional guidelines which affect hESC research and therapy and that complement the legislation and regulations. These are vital for ethical purposes, but are not binding even thought some are quasi-legal such as those from the Health Professional Council of South Africa (HPCSA).

5.6 PROFESSIONAL GUIDELINES

Professional guidelines in South Africa are drafted by the National Health Research Ethics Council for the functioning of research ethics committees and for the setting of normative standards for conducting research and clinical trials on human beings (Isasi, Nguyeni & Knopper 2006. p, 24). Normative measures that affect hESC research and therapy in South Africa include: Assisted Reproductive Technologies (ART) Guidelines (Laboratory Guidelines as well as Guidelines on gamete donation) drafted by the policy committee of the South African Society of Reproductive Science and Surgery (SASRSS); Guidelines on Ethics for Medical Research: Reproductive Biology and Genetic Research (Booklet No. 2 of 2000) drafted by the Medical Research Council (MRC) of South Africa and General Ethical Guidelines for Biotechnology Research (Booklet No. 14 of 2008) drafted by the Health Professions Council of South Africa (HPCSA). All these guidelines form part of the normative measures and mechanisms for conducting research and draw attention to the ethical implications of the professional actions.

5.6.1 Assisted Reproductive Technologies (ART) Guidelines of the South African Society of Reproductive Science and Surgery (SARSS)

ART Guidelines focus on the clinical treatment, laboratory procedures and the donation of oocytes, sperm or embryos, but with the intent for establishing a pregnancy. This provides mechanisms by which medical practitioners may recruit gamete donors, required age of a prospective donor (for both women and men), guidelines for oocyte and sperm donation, and how to advertise for recruitment in order to not entice or coerce a donor with statements such as "earning money" or "financial gain", but rather using terms such as reimbursement or compensation. In addition, an informed consent is required before donation, psychological evaluation, semen or oocyte analysis, genetic evaluation, personal and sexual history, physical evaluation, medical history (for any transplantation and those with xeno-transplants are excluded from donating), microbial and viral screening (such as HIV 1 and 2, Hepatitis B and C, Syphilis and if found these gametes will be excluded). All these details will then be recorded in a central data bank with the following prerequisites to ensure privacy and confidentiality of the donor(s): a unique identification number of the donor, number of donations by that particular donor, date of donation, number of children conceived through the process (IVF) and those born alive from the gamete's donor. This information will then be forwarded to the Director General as well the number of remaining gametes needed to be destroy, all this being in accordance with IVF's Regulations.

Moreover, the Laboratory Guidelines (of 2008) include the general standards for the personnel such as their acceptability and qualifications, and the requirement that these personnel must be registered with the HPCSA. These guidelines are meant to ensure that the

highest standards and integrity are maintained, and that personnel will keep the privacy and confidentiality of donors and children born through IVF procedures. Article 22 of the guidelines addresses issues pertaining to the facility, such as sterility and cleanliness, with the cryopreservation facility required to be secure. Moreover, there must be an emergency procedure in place, Standard Operation Procedures (SOPs) for all the vessels, freezing, thawing, location and duration of storage, handling and cleaning of the facility. Neither of these guidelines provide information on the type of recruiters and procedures that may be used to recruit donors, like what qualifications and/ or training they should have and whether or not they need to be registered with the HPCSA like with the personnel.

Article 5 of the guideline requires that before any research (this may include hESC research) using gametes or embryos there must be an approval by the REC and, to ensure privacy and confidentiality, that the donor's details may only be disclosed when permitted by the law and that the centre must provide a written procedure for considering application for access to confidential records. Neither of these SASRSS guidelines explicitly address issues that are concerned with hESC research, however, they do make provision of the use of gametes and embryos for research. Thus, inclusion of the use of gametes and embryo for hESC research and therapy through these guidelines would have been appropriate in order to guide donors and couples who come for fertility treatments to have a choice for donation of their gametes and IVF embryos at the different stages that these biological material may be required for hESC research and therapy. So too for donors who may prefer their left-over embryos to be used for research and/or therapeutic purposes rather than be discarded. However, this guideline does define the necessary ethical requirements for the personnel and facilities to ensure that the donor's rights are not violated and that their dignity is maintained through the whole process.

5.6.2 Guidelines on Ethics for Medical Research: Reproductive Biology and Genetic Research

This Guideline is subdivided into four chapters, Chapter 1 deals with the South African MRC's ethical policy, Chapter 2 with reproductive biology, Chapter 3 with the ethical issues regarding genetic research and practice and Chapter 4 contains references. Article 1.3 of the Guidelines describes the ethical principles applied to research in South Africa which includes autonomy, beneficence (benefit to the research participant), non-maleficence (absence of harm to the research participant) and justice (notably distributive justice-equal distribution of risk and benefit between communities). It further stipulates that most Western countries seem to emphasize autonomy over beneficence, and that this view is questionable in the context of many developing countries where solidarity within communities is valued as well as respect for individual choices. I believe that this is particularly relevant in South Africa, where Ubuntu places a much higher emphasis on solidarity in communities. In addition, where there are increasing concerns about conflicts between personal autonomy and public safety, concerns about distributive justice in developing countries enjoy a higher priority than in some affluent Western nations. This is of paramount importance not only in South Africa, but in other developing countries as well, and this concern needs to be adequately addressed legally and practically too by the State, researchers, investors, biotechnology and pharmaceutical companies.

Article 2.2 of the Guideline defines pre-embryo as a product of gamete union from the time of fertilisation to the appearance of embryonic axis. This stage is considered to last for 14 days. This definition could be adopted by the NHA, 2003 (No. 61 of 2003), albeit relevent

regulations to differentiate between an embryo and a foetus. With regards to hESC research, chapter 2 of these Guidelines makes provision for oocyte or sperm donations with compensation and allows donation of supernatant IVF cryopreserved embryos for other infertile couples and for research (research which will improve fertility issues or knowledge of such). A written consent is also required for gamete or embryo donations from donors and their spouses. The Guideline does not recommend maintenance of the embryo beyond 14 days, or creation of embryo for research purposes. However, because this is a normative guideline, it should have given ethical or moral reason for this prohibition.

Chapter 3 defines somatic cell gene therapy (which is part of therapeutic cloning) as "any cell in the body except the germ line cell" (article 3.2). This includes only those genes that would not be carried to the next generation, unlike those of germ cells, and would only affect the individual taking the treatment or therapy. Article 3.2.2 states that "somatic cell gene therapy provides correction of genetic information in those cells which require it for their normal function, which corrects or alleviates the genetic defect present in the individual without affecting the genetic information transmitted to that individual". The use of this definition should help lessen the fears and confusion concerning the use of the term 'cloning' in therapeutic cloning. The Act and regulation should rather adopt this term and definition to define therapeutic cloning. The Guideline does acknowledge that this therapy will require safety (which is vital) and that in order to apply it there must be REC approval with certain conditions, that are stipulated to be, "(a) there must be sufficient and medical knowledge, together with the knowledge of those proposing to undertake the research in order to make a sound judgement on (i) scientific merit of the research, (ii) it's probable efficacy and safety, (iii) the competence of those who wish to undertake the research and (iv) the requirement of effective monitoring; (b) the clinical course of the disorder must be known sufficiently well

for the investigators and those entrusted with counselling to (i) give accurate information and doctrine, (ii) assess the outcomes of the therapy". In addition, it states that "this therapy may have a wider implication than just correcting of a single gene disorder such as managing of wider spectrum of diseases ranging from HIV-AIDS and cancer". This Guideline recommends that this therapy be used only as treatment for patients in whom potential benefit is the greatest in relation to possible inadvertent harm. These patients are those with disorders that are life-threatening or cause serious handicap or serious diseases for which there may not be any other available or satisfactory treatment. This guideline does allow the use of therapeutic cloning (somatic cell therapy) with some ethical provisions, however, I disagree with its statement that this therapy should be only used if there are no any other treatments available, as a last resort. I am of the opinion that this therapy should be provided as an option just as with any other treatments, and that patients should be able to choose, with their medical practitioners' advice, which treatment will work best. Additionally, it is not clear who determines what disorders are life-threatening and thus suitable for this treatment. Moreover, this exclusivity will make such therapies expensive and thus unavailable to those who are from a poor and disadvantaged background, and may be suffering from such a life-threatening disorder. What then what would be the purpose of research and development of therapies and devices if it only benefits a wealthy minority, and then only as a last resort after all else failed? Rather, all the available options, including hESC therapies, should be weighed equally and an informed decision should be made. Allowing its use as only a last resort makes little sense, and such ideology hinders the growth of research and developments.

The Guideline does permit the use of human tissue and embryos, if the embryo is given special respect as a potential human life. As a result it recommends that only two sources of human stem cells should be used, those which are those from cadaveric foetal tissues, and

supernatant IVF embryos. This, it states, would be better than wasting both biomaterials, thus applying the principle of waste avoidance as already explained in Chapter 2 (section 2.2.1 page 24). Again this is also similar to the Act and regulations in that it doesn't provide any morally justifiable reason as to why the other sources cannot be used. This Guideline makes a distinct difference between therapeutic cloning and somatic cell gene therapy for the purpose of harvesting human tissue that would be for research purposes. The Guideline states that "this procedure undermines human dignity as it devalues the potential life of all human embryos and prioritises the needs of living individuals over the potential life of the embryo. Where an embryo is being created and allowed to develop to a stage where it would be a source of 'spare parts' for the donor of the nucleus". However, this notion has some flaws as the embryo is firstly not protected by section 10 of the Constitution, nor by section 11. Furthermore, it is not explained why we should not prioritise the needs of living individuals who may be in need of therapy suffering from 'life-threatening' diseases. The Guideline does not justify the use of one and not the other. This seem to be suggesting that an embryo has a 'higher' moral status and value than a living individual. In conclusion, and not contradicting what I have already said, this Guideline does address all the necessary ethical issues that are required for hESC research and therapy, albeit restrictive. However, once again, they should widen their scope to also include 'fresh- embryos' and the creations of embryos by IVF and SCNT for research and therapy, and ensure that this will be conducted in a moral and ethical manner which will be acceptable to the community and society. However, different countries have different moral ways of living, and these ethical principles must also be weighed against their social standards and values to better mesh with the moral framework of the global community.

5.6.3 General Ethical Guidelines for Biotechnology Research Guidelines: Health Professional Council of South Africa (HPCSA)

The HPCSA booklet 14 of the Biotechnology Research Guidelines consist of 12 chapters. Those important for hESC research and therapy are chapter 1, which deals with the relevant ethics, chapter 2 which deals with guiding principles, chapter 3 which deals with the ethics of research related to healthcare in South Africa as a developing country, chapter 9 which deals with intellectual property and commercialisation matters, and chapter 12, which deals with the medical research and healthcare. This Guideline requires that research be conducted with safety standards, honesty, integrity and respect for human dignity, in addition to respect of autonomy, beneficence, non-maleficence and justice or fairness, in line with the MRC Guidelines previously discussed. Furthermore, it ensures the law and system of government is respected, research conducted is of relevance to the South African society, informed consent (both verbally and written) should be obtained by biotechnologists (which could be a problem). Speaking as a biotechnologist, I was never trained to meet these standards, and based on my own knowledge, neither are other biotechnologists. Even after conducting a search of the curricula from different universities across the country, I found no ethics or ethical principles included in the courses offered at the undergraduate and post-graduate level (Btech or honours degree) that ensures the researcher is competent and adheres to ethical guidelines during the course of their research. The problem then is that if biotechnologists are not trained and taught any moral principles as part of the curriculum they cannot be expected to identify any ethical issues arising within their field. Additionally and in support of my statement, Reyes (2003, p. 1) mentions that “there are no ethical content and decision making instruction in scientific curricula. Moreover, that code (of ethics that is) are not particular well publicized and science students are not sufficiently educated in such code at university”.

Of course he is making his statements based on the universities that he has observed and on issues concerning biotechnology, particularly bio-warfare. As a trained biotechnologist I did not have any ethical training or awareness as part of my curriculum, nor, as far as I'm aware did those in other fields of science such as Molecular biology or biomedical science. Ethical responsibility would have to be added as part of the curriculum so that trained scientist or researchers are better able to meet the requirements and suggestions of the Guideline, or perhaps should attend a course such as those for Standard Operation Procedures (SOP). This will help especially in research and development with biological materials such as human embryos and how such technology may affect society at large, as well as how scientists have a societal impact (whether negative and positive). This should help scientists learn how to weigh potential risk versus benefit on ethical as well as moral grounds when conducting research and development. Scientists can further refer to the DoH document titled "Ethics in Health Research: Principles, Process and Structures" of 2015, chapter 2: Guiding Principles for Ethical Research, which elaborates on the broad ethical principles to be used namely: beneficence and non-malficence, distributive justice (equality) and respect ofor persons (dignity and autonomy), for clarity and understanding on the ethical principles and use thereof. (See footnote 6, page 126, to access document for further reading). I will not go into details on these principles and use by scientist as this is beyond the scope of my research study, however scientists can make use of this document to guide them.

The Guideline further states that all the medical biotechnologists conducting such research should be registered with the HPCSA. However, in South Africa biotechnologists are not required to register with the HPSCA, unlike with the medical technologists. This is another issue that needs to be addressed by the Minister of Higher Education or the Minister of Science and Technology, as well by universities. There is no use in teaching and training

students in medical biotechnology but not providing a way for them to be registered with the HPCSA, especially since the HPCSA requires such in order to recognise researchers in fields such as stem cell technology. Although, one can always register with the HPCSA when they begin employment within the medical field, as this is a prerequisite.

Regarding informed consent, the Guideline makes provision for vulnerable participants and requires that all relevant information be provided to the participant. Furthermore, issues of privacy and confidentiality are also addressed, such as decoding of samples upon retrieval and storage, as well as the use of samples by third parties. In the context of hESC therapies, the Guideline has a definition for therapeutic cloning which is different from the Act, "the process of somatic nuclear cell transfer (SCNT) where nucleus from an adult cell is injected into a human ovum of which the nucleus has been removed". In general, the Guideline requires that all biotechnology therapies should go through a risk assessment such as short and long term impact on humans, animals and the environment. Additionally, risk management and strategies must also be established to ensure any risks are effectively managed. All these risks must be identified, reported to relevant authorities and addressed immediately, especially those of stem cell research, to ensure that necessary measures are taken.

Thus, this Guideline allows hESC research as long as the embryo does not exceed the 14 days of the development stage stipulated in the Act. It prohibits manipulation of any genetic material including genetic material of human gametes, zygotes or embryos for the purpose of reproductive cloning of human beings and any activity including nuclear transfer or embryo splitting for the purpose of reproductive cloning of human beings. This section being in line

with section 57 of the National Health Act of 2003, prohibits any form of reproductive cloning, import and export of an embryo without prior written approval of the Minister of Health and placing of a cloned human being into the body of a human being or animal. Also prohibited are the creating or developing a human embryo which contains the genetic material of more than two persons, collecting viable human embryo from the body of a woman, placing a cloned human embryo into the body of a woman, commercial trading of eggs, sperms or embryos humans and research involving totipotent stem cells. However, cadaveric foetal tissues are allowed to be harvested for research with all the relevant ethical principles adhered too. This may make allowance for 'organically dead' embryo as they may be defined as cadaveric foetal tissue. If this is the case it means that an 'organically dead' embryo may be harvested and used as a source for hESC research & therapy. However, there are no appropriate regulations for this provision within the law, as seen with the previously discussed Regulations. It does open up more sources to be harvested for hESC research, although the use of this particular source may require additional ethical guidelines as it has its own concerns.

In summary, this Guideline prohibits the creations of embryos by IVF procedure and SCNT for research, permits harvesting of supernatant IVF embryos not exceeding 14 days, and cadaveric foetal tissues for hESC research. However, not much is said regarding hESC therapy and how it should be handled (morally that is) and furthermore prohibits patenting (which I will discuss later in the Chapter). It is alarming that a Biotechnology Guideline does not include hESC research in as much detail as one would expect especially when comparing it to the previous Guidelines. It also does not touch on hESC therapy and prohibits patenting of biotechnology inventions discouraging biotechnology companies looking to invest with

some hope of return. Such patents are usually the incentives for biotechnology companies, and yet a Biotechnology Guideline suggests the prohibition of hESC patents.

Human ESC research is not well regulated by the legislation (NHA No. 61 of 2003), the regulations and professional guidelines. This will slow down or halt hESC research as there is no conducive environment for this research to grow and progress, and for scientific knowledge to be extracted from it and be used to either develop or make improvements in medical products or devices or therapies' of diseases that are specifically affecting the South African society. Furthermore, 'fresh embryos', for research should also be permitted and regulated by the legislation, as there is no constitutional or moral justifiable reason as to why it should not allowed. Moreover, relevent regulations regarding stem cell, i.e. hESC research and therapy need to be developed and intergrated as part of the legal regime to overcome some of the loopholes noted within the regulations. This regulations should be written in a way that it is readable and intentional regarding sources of human embryo to be used, therapuetic purposes and application of hESC therapies and devices as well as other issues such as definitions, donations and storage etc. In addition it should also address other issues such as the type of relevant individual (s) and / or body (ies) for stem cell and how these will be appointed and the power they have be given by the Minister apart from other technical, scientific, health, therapuetic or clinical and ethical issues regarding hESC.

In conclusion, on this section, South African law, regulations and guidelines do permit research on excess IVF embryos, creation of embryos through IVF as well as through SCNT, cadaveric foetus tissue (which could be translated as organically dead embryo). Moreover, the legislation also permits for therapeutic purposes embryos created through IVF as well

through SCNT processes. Even though this is the case the law, regulations and guidelines are not coherent and this makes it challenging to regulate hESC research and therapy within South Africa. Next I will focus on the Medicine and Related Substance Act regarding hESC therapy.

5.7 MEDICINE AND RELATED SUBSTANCE ACT, 1965 (No. 101 of 1965)

The Medicine and Related Substances Act, 1965 (No.101 of 1965, as amended in 2008) as amendment (No.14 of 2015), deals with the control and regulation of all medicine, medical devices and schedule substances. The Act consists of forty chapters and deals with many relevant aspects of medicine including the constitution, labelling, packaging, import and export, registration, pricing and control of medicine. This Act is also supplemented by regulations such as the General Regulations made in the Medicine and Related Substance Act, 1965 (No. 101 of 1965). In terms of my research focus and study, Section 14 titled: "Prohibition on the sale of medicines which are subject to registration and are not registered", is of particular importance as it may address issues relating to hESC therapies. In the early stages of these therapies they will be deemed 'experimental', and not yet registered as viable medical treatments. This could be medicine that may be required in life-threatening situations or when other medicines have not been effective for that patient (who is suffering from a life-threatening or 'serious' sickness or disease) and may be urgently required by that particular patient. Such medicines cannot be sold as they are still undergoing clinical trials, however,

section 21 of the Act addresses sales of unregistered medicine, including therefore medicines that are undergoing clinical trail and thus probably makes provision for these medicines.

Section 14 (4) (a) (b) permits the use of such medicine provided that the quantity given does not exceed the quantity required for treatment. However, section 14 (4) (b) has another clause which stipulates that the 'substitute' or 'complimentary' medicine should contain an active component that appears in another medicine which is registered under the Act. This may pose some limitations on a medical practitioner who wants to use a particular hESC based therapy as most are still in their infancy and may be regarded as experimental therapies. Therefore, since these sections address this issue they should have also included a subsection to accommodate the use of such medicinal products, especially those related to biotechnology medicinal product such as from hESC technology, as well as how such an active ingredient may be determined prior to their registration. Although this issue may be addressed specifically in the Regulations such as the one that deals with medicinal devices and *in-vitro* diagnostic medical devices.

Section 15 (C) deals with the measures that ensure affordability of medicines such as those from patented processes or products (although market value and patent are separate and the market value is not influenced by whether a product is patented or not), or generic medicine which may be required under certain circumstances to protect the health of the public. Section 15 (C) (a) stipulates that "notwithstanding anything to the contrary contained in the South African Patent Act 1978 (No. 57 of 1978), determine that the rights with regards to any medicine under a patent in the Republic shall not extend to act in respect of such medicine which has been put onto the market by the owner of the medicine, or with his or her consent".

This is particularly important since most biotechnology therapies and medicinal devices may currently be patented, or will be in the future. This section provides availability of such medicine and medicinal devices to the public by ensuring that the commercial price is affordable to the less advantageous patients, as well as not overriding or violating the constitutional rights of the patentee or owner. This section is vital to ensuring social justice within society regarding health issues and that health resources are improved and developed. This responds to section 27 of the Constitution[11], particularly with regards to diseases such as HIV-AIDS, tuberculosis and malaria. Thus by addressing the marketing price of patented medicine the Act responds to Section 27 (1) (a) and (2) of the Costitution in ensuring that the right to health care is not infriged upon by placing the necessary legislative and measures. This is also just as crucial with regards to hESC therapies, which may be viewed as immoral, based on assumptions that they will be very expensive, making them unavailable to those who are less fortunate and from disadvantaged backgrounds, until such a time when bio-similar or generic medicine or medical devices are developed and produced after the patent period has passed. Example of such issues will be further discussed in the next chapter.

Section 21 addresses issues of selling unregistered medicine for certain purposes, medicines such as those which are already in clinical trials or experimental medicines. However, these have certain requirements such as allowing a specified period for such a sale, quantity of the medicine or therapy to be sold and that such application must be done through the counsellor. The counsellor will then decide and give a written authorisation, and may in the same manner also withdraw the sale of that particular medicine. Section 22 (A) addresses issues concerning control of medicine and scheduled substances. This section requires that all medicines,

[11]Section 27 "(1) Everyone has the right to have access to- (a) health care services, including reproductive health care. (2) The State must take reasonable and other measures, within its available resources, to achieve the progressive realisation of each of these rights".

scheduled substances, medicinal devices and IVD (*in-vitro* diagnostic medical devices) be manipulated in a prescribed manner (as stipulated in the Act). Thus, therapies from bio-technologies are classified into classes and dealt with separately in Regulations for medical devices and IVD. This Regulation has just been implemented (in 2015) seeing the number of biological, medical devices and IVD emanating from biotechnology. An example of some of these products which have been registered with the MCC or are currently on clinical trials include: Bone Fillers, Bone Derived Products, Altis Osteogenic Bone Matrix (Altis OBM) or OptiSerum made from cord blood serum and AmnioMatrix (dehydrated as well as Cryopreserved) made from amniotic membrane (Next Biosciences). All these fall under a specific class which is determined by specific rule.

Biotechnology medicinal products, IVD and devices will fall under the sections for these classes or categories which are found only in the Regulations that supplement the Act called "General Regulations" Made in Terms of the Medicines and Related Substances Act, 1965 (Act No. 101 of 1965, amendment). According to this Regulation, medicines are divided into four basic categories found in Regulation 25 (1): "(a) Category A = Medicines which are intended for use in humans and which are without manipulation, ready for administration, including packaged preparations where only a vehicle is added to the effective medicine; (b) Category B = Medicine which cannot normally be administered without further manipulation; (c) Category C = Medicines intended for veterinary use which are without further manipulation, ready for administration, including package preparations where only a vehicle is added to the effective medicine; and (d) Category D = Medicine which are Complementary Medicines intended for use in humans and animals which are without further manipulation, ready for administration, including packaged preparations where only a vehicle is added to the effective medicine*"*. hESC therapies or medicinal products and devices will therefore fall

under categories A, B or D. Sub-regulation 25 (2) deals with the different types of classifications in which the above categories can be applied. These classifications are divided into: "central nervous stimulants; central nervous system depressants; connective tissue medicines; local anaesthetics; medicine affecting autonomic functions; cardiac medicines; vascular medicines; medicines acting on blood and haemopoietic system; medicine against alcoholism; medicine acting on respiratory system; medicines on gastro-intestinal tract; anthelmintics, bilharzias medicines, filaricides etc.; dermatological preparations; preparations for treatment of wounds; ophthalmic preparations; ear, nose and throat preparations; medicines acting on the muscular system; medicine acting on the genito-urinary system; oxytocics; antimicrobial (chemotherapeutic) agents; hormones, antihormones and oral hypoglycaemics, vitamins; amino-acids; mineral substitutes, electrolytes; special foods; cytostatic agents; chelating agents (versenates) as heavy metal antidotes; contrast media; diagnostic agents; biological; enzymatic preparations; and other substances or agents*"*. Therefore the classification hESC medicinal products or devices will fall under will depend on its intended use. Regulations Relating to Medical Devices and *In Vitro* Diagnostic Medical Devices (IVDs) (No. 1515 of 9 December 2016) was promulgated and deals with matters relating to medical devices and IVF, hence some of the hESC therapies which may be classified as medicinal devices will also be regulated by it. The Regulation classifies medical devices and IVD into 4 classes: Section 11 (1) "the following are classes of medical devices and IVD; (a) Class A- Low Risk, (b) Class B – Low- moderate Risk, (c) Class C – Moderate-high Risk and, (d) Class D- High Risk…where risk relates to the patient, user or to public health".

Depending on the type of device hESC will be processed and developed into, it will then fall under one of the above classes, which will be determined by the council based on the

classification rules. As Section 11 (5) says "The Council must consider the classification of the medical device or IVD individually, taking into account its design and intended use". This explains how the Council will determine which class the medical device in question will fall under. However, Section 11 (4) "Where the classification of a medical device or IVD is inconclusive and places it in more than one class, or between classes, the Council must after following the classification rule, place the medical device or IVD in the higher of the risk classes". This therefore allows issues where medical devices are not specific to one class to be resolved, and I agree with this rule of determining classification in these uncertain cases. Such medical devices should belong to a class with a higher risk profile, in case of adverse events. All the Classification Rules and details on the determination of medical devices may be found in the General Information Medical Devices and IVD of Sept 2015. I will not be discussing this document due to the limitation of my thesis but can be accessed from: http://www.mccza.com/documents/838804628.01_General_Guideline_Medical_Device_IVD_Aug15_v2_for_comment.pdf.

Section 22 (G) addresses the committee which handles the issues regarding marketing pricing of medicine and medical devices. The pricing system is, or rather should be transparent, with an appropriate dispensing fee to be set by the wholesalers or distributors. However, this only addresses those medicines and medicinal devices that are controlled and scheduled and not those from biological or biotechnology categories and classifications. Therefore, this results in a legal vacuum regarding the pricing system concerning these biotechnology categories and classifications and how they should be priced. Furthermore, the pricing committee consists of not more than 15 members which include, The Minister of Finance, Minister of Trade and Industry, a person from the Department of Health, a Pharmacologist, person with a law background and one with a background in academic

medical research, 2 people with backgrounds in economics (health economics) and an independent patient or consumer group. These people will then be responsible for discussing and evaluating market pricing for the medicinal products, devices or therapies including those of hESC therapy.

The Medicine and Related Substance Act, 1965 (No. 101 of 1965 amended in 2008) and its Regulations have been amended to include medical devices and IVDs, which has managed to create better opportunities and less lacunae for biotechnology companies who may want to register and license their therapies. The inclusion of medical devices and IVDs in the Act as well as the implementation of the Regulation and the General Information document all assist in creating a legal and regulatory environment for such medicines to grow, including those therapies that will emanate from hESC. However, still missing is the including of a bioethicist in the pricing committee to be able to address and deal with ethical and moral issues from the commercial price or distributive justice. In the next section I will analyse Intellectual Property Rights (IPR.) Act and the Patent Act concerning hESC research and therapy.

5.8 INTELLECTUAL PROPERTY RIGHTS FROM PUBLICLY FINANCED RESEARCH AND DEVELOPMENT ACT, 2008 (No. 51 of 2008)

"The Intellectual Property Rights (IPR) system is used as an operation for providing limited rights to exclude certain defined third party use of a protected material. This protection is

generally intended to strengthen market-base incentives for private sector stakeholders to invest resources in product development and marketing of new technologies. Such incentives are considered especially valuable for the development of medical technologies (i.e. hESC based therapies) due to the considerable financial and technical resources required, coupled with the high risk of failure, even at a late stage in product development. There are also issues related to product liability, with many medical technologies being expensive to develop, but relatively cheap to produce" as stipulated by the World Health Organization, World Intellectual Property Organization & World Trade Organization reports (2013. p, 53). Thus, IPR protection may be sought by companies investing in such products and therapies.

Just as with any other field in technology, biotechnology companies that invest in hESC research and development would in turn seek property protection for their investment by obtaining IPR over that particular process or product in the form of a patent. These biotechnology patents, biopatents, are perceived by many to be unethical and immoral, especially those regarding hESC research and therapy. There are concerns such as the property rights concerning inventions stemming from the human embryo, as well as the commercialisation issues (as discussed already in Chapter 4), which many view as violating human dignity and respect (I will analyse how these patents may be viewed in this manner in the next chapter). In South Africa, the Intellectual Property Rights of Publicly Financed Research & Development Act 2008 (No. 51 of 2008) is the main legislation addressing issues of property rights and commercialisation and will now discuss some of these issues especially concerning hESC technologies.

Section 2 (1) of the Act states that "the objective of the IPR Act is to make provision that intellectual property emanating from publicly financed research and development is identified, protected, utilised and commercialised for the benefit of the people of the Republic, whether it be for a social, economic, military or any other benefit". Furthermore, section 2 (2)(d) states that "human ingenuity and creativity are acknowledged and rewarded", section 2 (2)(e) states that "the people of the Republic, particularly small enterprises and BBBEE (Broad Base Black Economic Empowerment) entities, have preferential access to opportunities arising from production of knowledge from publicly financed research and development and the attendant in IPR". Both subsections are important for biotechnology companies.

An important aspect of this Act is that it provides and ensures that there are publications from publicly financed research and development which is to the benefit of the public. Even though, section 2 (1) makes it reads as if it only makes provision for publicly finance and thus creates a vacuum for privately financed research and innovations. This should have been drafted in a way that would accommodate privately finded research and innovation, albiet this Act is read together with the Patent Act. Ownership of the IPR is given to the recipient and Section 5 of the Act addresses all the necessary management obligations and disclosure duties of the recipient or proprietor. In addition, the IPR Act is of importance regarding commercialisation issues of any technology and of protecting that right. This duty is given to the National Intellectual Property Management Office (NIPO) in order to ensure that transactions and commercialisation of the intellectual properties amongst other functions are protected and promoted (as stipulated under Section 9). According to the Act, preference of IPR would be given to non-exclusive licensing (to promote non-exclusivity amongst IPR), BBBEE, small enterprises and parties who seek to use the intellectual property in ways that

provide optimal benefit to the economy and quality of life of the people of the Republic. Such benefits would ensure that social issues (such as those of health, nutrition and security) are provided for through IPR.

Non-exclusivity is preferred as knowledge emanating from those intellectual properties may be made available for use in other research and development, for example in the development of bio-similar medicines and/ or generic medicines, without any infringement issues. This will result in progress in that particular field as well as development of new products that are required and are crucial for the public. The matter of exclusivity and non-exclusivity is of particular concern regarding biopatents, where exclusivity of these patents tends to halt or slow down research and also tends to make it difficult for others to make use of the knowledge until that patent has expired. Whereas if non-exclusivity is given to all intellectual properties, it would provide a way to make better use of those intellectual properties, especially with technologies which have complex ethical issues such as hESC research. This is of particular importance where therapies may be required for 'serious' or 'emergency' diseases and disorders. Moreover, such therapies protected by IPR may be expensive in the beginning, making them unavailable to some individuals. This non-exclusivity clause may reduce the chances of that happening by and would also help increase the chances of creating bio-similar or generic medicines which are more affordable and therefore more accessible to the public.

In the context of hESC research and therapy, IPR will be granted in the form of patents. Although the IPR Act seems to only addresses IPR for publicly financed research studies, many who may invest in hESC technology will be privately funded biotechnology or

pharmaceutical companies and hence different rules or laws may have to be applied (again even though this act is read together with the Patent Act). Of particular concern are non-exclusivity issues and the accessibility of information to be used for the public. In order to understand how this may work under South African laws, I will now analyse the South African Patent Act 1978 (No. 57 of 1978).

5.9 SOUTH AFRICAN PATENT ACT, 1978 (NO. 57 OF 1978)

SA patent legislation is regulated by the Patent Act, 1978 (No. 57 of 1978) which has had various amendments such as Patent Amendment Act No.14 of 1979; Patent Amendment Act No. 67 of 1983; Patent Amendment Act No. 44 of 1986; Patent Amendment Act No.76 of 1988; General Law Amendment Act No 49 of 1996 (with effect from 4 October, 1996); Intellectual Property Laws Amendment Act, No.38 of 1997; Patents Amendment Act No. 10 of 2001 and Patent Amendments Act No. 58 of 2002. However, the Act is currently being reviewed for further amendment in order to implement some of the TRIPS Agreements after the Doha Declaration. Many have argued that patents either slow down or halt research, innovation[12], thereby access to medicinal products and devices.

[12]For further reading see: Australian Law Reform Commission. (n.d.) Patents and Human Genetic Research from: https://www.alrc.gov.au/publications/12-patents-and-human-genetic-research/impact-gene-patents-research; Biotech needs 21st century patent system: Expert from: https://www.bio.org/sites/default/files/BioNASReport.pdf; Nithya, A. (2011) Accommodating Long Term Scientific Progress: Patent Prospects in the Pharmaceutical industry. *Journal of Intellectual Property Rights*. Vol 16: pp17-22; Eisenberg, R. (1989) Patents and the Progress of Science: Exclusive Rights and Experimental Use. *U.Chi.L.Rev*, 56: pp 1017-1086 and Salter, B. & Salter, C. (2013) Bioethical ambition, political opportunity and the European governance of patenting: The case of human embryonic stem cell science. *Social Science & Medicine*, 98: pp 286-292.

The South African Patent Act, 1978 (No. 57 0f 1978) grants the patentee with monopoly rights for 20 years, similar to the patent system in the United States of America, from the date of application. The South African system therefore operates on a first to file basis. The following criteria are required to grant patent rights, as found in Section 25; new invention or inventive step, new utility that may be applied in trade, industry or agriculture (must be industrially applicable. The *ordre public* and morality clause also found in Section 36 includes morality issues related to commercialisation, whereas Section 25 addresses morality issues that are related to processes or methods, i.e. manufacturing, of the technology. The South African patent system, unlike the European Union's (E.U) law (Biotech Directive and European Patent Content Convention (EPC)), is one of the few that includes an *ordre public* and morality clause as a criterion for either granting or revoking a patent. However, as I have noted through analysing and reviewing South Africa's patent legislation, it does not specify what breaches the *ordre public* and morality clauses with regards to biopatents. Furthermore, no patent has been rejected or revoked based on this clause (patent of any technology and not just those in Biotechnology). The *ordre public* and morality clause is therefore an issue that needs to be analysed and addressed, and this should be done in the context of South Africa's moral standards and values, which I will discuss in the next chapter.

In addition, the granting of patents in South Africa is based on the registration system and not on the examination system (as stipulated in Section 7), where a patent is registered at the patent office and registrar is the person responsible for the patent application. This is unlike those countries which have an examination system, where a patent application would be examined and it would be determined whether or not the technical method or commercialisation of the patent offends *ordre public* and morality, before a patent is granted. South Africa has no formal legal basis for such an examination system which may cause

problems in the future regarding the granting of unethical patents or the revoking of patents that may benefit society or public healthcare. It is important that this matter be addressed, since biopatent have sparked ethical debates, particularly those related to hESC.

Another matter of importance that may be indirectly related to the morality clause, is the licensing of patents, patent infringement as well as patent revocation. Licensing of patents can affect research, innovation or access to medical products, devices or progress in science and technology by either slowing down or halting this technology. High licensing fees or royalty fees which are often sought by the patentee or patent holder(s) may have the same result. The issue that arises here of course is that exclusivity rights are needed for privately funded research, but non-exclusivity is required for its furtherance, as well as for public availability of potentially lifesaving, or live changing therapies. Therefore, the Republic will have to fund, fully or partially, such research in order for this technology to progress and to build an environment in which private funding may also be financially feasible. It is important to note that non-exclusivity does not mean that the patentee has no rights over the patent, but rather will ensure development of essential medicines or medical devices for public healthcare.

Chapter VIII from Section 53-54 of the Patent Act addresses licencing rights, cancellation of endorsements of patents, compulsory licencing in respect to dependent patents, compulsory licencing in the case of abuse of rights, termination of contracts relating to licences and the effects of licences. Chapter X of the Act deals and addresses with issues concerning patent revocation. Of particular interest, particularly regarding the focus of this study, is Section 61

(c), (h) and (i) which points out that patents may be revoked based on *ordre public* and morality, amongst other reasons.

Chapter XI addresses and deals with the infringement of patents, issues such as patents having too large a scope or how one patent having a variety of patents under it may cause patent infringement by third parties. This is where the non-exclusivity and examination of those patents becomes important, as well avoidance of patent infringement. This has been an issue regarding biopatents where the non-exclusive clause should include private investors and not just publicly financed research and development. Moreover, the South African patent system needs mandatory options for privately funded research and development, which may be provided in a supplementary Regulation.

The guideline does not explain what it means by 'appropriate', however, it seems to suggest that any information from stem cell research and prophylactic therapies IPR (patent) cannot be granted. Additionally the Guideline on Ethics for Medical Research: Reproductive Biology and Genetic Research (MRC Booklet 2) Article 3.5 titled "Patenting human genes and proteins" and the HPCSA booklet 14: General Ethical guidelines for Biotechnology Research (2008) article 9 titled "Intellectual Property and Commercialisation", prohibits patenting of biotechnology inventions. This would include those from hESC research and therapy as it is states that "they obstruct access of medicine to the poor and disadvantaged population by these new discoveries which may be of beneficence to them, but become unavailable due to these patents". The Professional Guidelines (General Ethical Guidelines for Biotechnology Research Guidelines: Health Professional Council of South Africa (HPCSA)) prohibit any biotechnology inventions from being patented. There is no ethical or

legal justification for this prohibition. Although patents do contribute to medicine and therapies being inaccessible due to high cost, this is not always the case, and prohibitions of these patents is not a viable solution. Rather it is regulation of Patents that is required, not prohibition.

The Patent Act supersedes the Guidelines and thus biotechnology inventions (hESC patents) can be legally patented. How ethical these patents may be is what needs to be determined and evaluated to make sure that patents are not granted which may be offensive to *ordre public* and morality. An examination guideline for that clause will have to be drafted and implemented. In order to have a better assessment of the morality clause individuals who are experts in bioethics will be required to set up appropriate guidelines and tests, not just lawyers and biotechnologist. This is particularly so within the field of hESC with its many diverse ethical issues regarding the moral status of the embryo, and the harvesting of the human embryo for research and therapy. Currently, the South African Patent Act is under review in order to implement the TRIPS Agreement after the Doha Declaration. This was reported by the Minister of Health (Dr Aaron Motsoaledi) in a television show called Interface which aired on SABC 3 on the 8th of April 2014, in an interview concerning the provision of more affordable medicine to the public and how IP policies affect this and what changes were needed by the Republic[13]. I will review the TRIPS Agreement and the important sections that may be implemented in the Act.

[13] Draft amendment reference titled Draft Intellectual Property Right of South Africa Phase I: Government Gazette No.41064 of 25 August 2017 can be accessed from: https://www.greengazette.co.za/notices/draft-intellectual-property-policy-of-the-republic-of-south-africa-phase-1-2017-for-broader-public-comments_20170825-GGN-41064-00636.

In conclusion, the Medicine and Related Substance Act should make provisions for biotechnology classifications as well as include a Regulation for these classifications. Moreover, an addition of a Bioethicist on the pricing committee will help avoid 'high' prices when it comes to hESC based therapies which may in turn be against *ordre public* and morality. Human ESC patents should not be prohibited, but rather patent examination and guidelines on how to examine these patents need to be put in place to avoid offensive patents or therapies which will be against *ordre public* and morality. In addition, this system is also required to avoid patent pool, patent infringements, revocation and high licensing fees. These issues are vital within all biopatents (from biotechnology) but more especially important with regards to hESC as this technology is mired in so many ethical issues. Being able to address hESC patent's ethical and legal issues will be a great start in creating and facilitating a friendly environment for hESC research to grow and develop within South Africa and Africa as a whole.

5.9.1 TRIPS Agreement

The World Health Organisation states: "the appropriate balance is set by the National policy makers and legislators, the international legal framework provides the context and general principles of the National System" (World Intellectual Property Organization & World Trade Organization 2013. p, 54). The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) which forms part of the World Trade Organization (WTO) legal system and which in-turn incorporates the substantive provision of several World Intellectual Property Organization (WIPO) treaties, has considerable implications for the applications of the IPR to medical technologies, these being the minimum standards that safeguard the rights of IP

owners while avoiding barriers to legitimate trade (World Health Organisation, World Intellectual Property Organization & World Trade Organization 2013. p, 54 & 70). Therefore, the TRIPS Agreement may be used by South Africa's IPR policy makers and legislators to provide a general guideline and principle for hESC patents. The TRIPS Agreement general obligation or duty is stated in Article 1 of the Agreement and is titled "Nature and Scope of obligation". This article makes provisions for member states to effectively implement the Agreement and moreover, provide more extensive protection than required by the Agreement in their own law, should they choose to.

Furthermore, Article 8 titled "Principle Provision" stipulates that: "(1) 'Members may, in formulating or amending their own laws and regulations adopt measures necessary to protect health and nutrition, and to promote public interest in sectors of vital importance to their social-economic and technological development, provided that such measures are consistent with the provision of this Agreement'; (2) 'Appropriate measures provided that they are consistent with the provision of this Agreement may be needed to prevent the abuse of intellectual property rights holders or the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology'". Thus, subsection 8(1) provides the WTO members with a defensive shield for domestic public interest against inconsistency with IP obligations under TRIPS, which is severely limited by a crucial further requirement stating that any such measures must be "consistent with the provision of this Agreement" (Ruse-Khan 2010. p, 12). South Africa is a signatory and member of the WTO and must comply with these Agreements as stipulated by implementing them in its legislation, hence the sudden review and amending of the Patent Act.

The most important section that would be implemented in the South African Patent Act, 1978 (No. 57 of 1978) will be what is stipulated in Article 27 under Section 5 titled "Patentable Subject Matters". Article 27 (1) stipulates that "Subject to the provision of paragraph 2 and 3, patents shall be available for any inventions, whether products or process, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application. Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 8 of this Article, patents shall be available and patent rights enjoyable without discrimination as to place of invention, the field of technology and whether products are imported or locally produced". Article 27 (2) "Members may exclude from patentability invention within their territory of commercial exploitation of which is necessary to protect *ordre public* and morality including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law" and, Article 27 (3) "Members may also exclude from patentability: (a) diagnostic, therapeutic and surgical methods for the treatment of humans or animals; (b) plants and animals other than micro-organisms, and essential biological processes for the production of plants or animals or other non-biological and microbiological processes. However, Members shall provide for the protection of plants variety either by patents or by effective *sui generis* system or by any combination thereof. The provision of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement".

Article 27 (2) was probably influenced by the E.U legislation regarding biopatents which has guidelines for biopatents and hESC patents (which are prohibited based on this clause). Specifically what constitutes as being against *ordre public* and morality, and thus making provision to either reject or revoke biopatent based on this clause. However, South Africa

(unlike with E.U countries) does not examine patents to ensure that this criterion is not offended in granting or revoking of biopatents, since it has not set any examination guidelines. In order to meet the guidelines set down in the Agreement, South African should adopt the patent examination system akin to the one used in the E.U. and have a general set of guidelines for biopatents.

5.10 CONCLUSION

"In conclusion, future medicine and medical technology regulation is increasingly reliant on highly sophisticated scientific skill, such as using hESC technology, and the capacity of regulators, combined with a great degree of collaboration and cooperation" (World Health Organisation, World Intellectual Property Organization & World Trade Organization 2013. p, 51). Laws, regulations and professional guidelines all play a pivotal role in ensuring and facilitating a conducive environment for the improvement and progress in research, innovation, and access to safe, effective, quality and affordable medicine and medicinal devices, ensuring social justice through appropriate distribution of these technologies, i.e. hESC research and therapy. What seems to be currently lacking in South Africa is the implementation of the laws, coherence within the laws as well as ethically and morally justifiable reasons in some of these law and regulations (as to what is permitted, restricted and prohibited and why).

hESC research is also not well regulated by the NHA as well as the Regulations that supplement this Act, although this is without any moral justification. South African regulations need to be reviewed and amended to allow (intentionally even with restrictions) for the use of certain sources (such as 'fresh embryos') for research and / or therapeutic purposes as well as for more coherent legislation to facilitate clarity, growth and development of hESC technology in South Africa. Currently hESC legislation has lacunae that need to be addressed and corrected in order to facilitate legislation that will provide growth and allow hESC technology to flourish. This can be made possible with development of appropriate policies by individuals who are experts in the different fields required, and who will make such decisions based on robust ethical reasoning that is be morally justifiable and to the benefit of the country as well as society at large.

With that said and in conclusion, South African laws, regulations and professional guidelines concerning hESC research and therapy have a long way to go to fill the legal and regulatory vacuum regarding hESC research and therapy. In the following chapter I will normatively analyse the laws, regulations and professional guidelines regarding hESC research and therapy.

CHAPTER 6: NORMATIVE ANALYSIS OF THE LAW, REGULATIONS AND PROFFESIONAL GUIDELINES

6.1 INTRODUCTION

Normative principles may be used to approach and understand moral issues that are based on new emerging technologies. The advent of hESC technology has sparked both hopes and fears, as well as many ethical dilemmas. There is fear that human life will be devalued through patents and commodification, while hopes or expectations are based on the promising benefits which may result from this technology. Due to the contrast of these fears and hopes, this technology has caused moral ambivalence as to how social responsibility and justice will be met through it. Social responsibility and social justice are very important, especially when it comes to biotechnology, as seen with previous cases such as those of Human Genome Projects (HGP). Ever since such biotechnological projects, any scientific projects that concern high life forms such as those of hESC are now faced with the same dilemmas and issues.

Human ESC is already facing ethical issues regarding the destruction of and the moral status of the human embryo, making it vital that issues concerning social responsibility and justice are dealt with while this research is still in its infancy. This is in order to ensure steady progress in the future and so as to not follow in the footsteps of the HGP which had to be stopped due to these ethical issues that were not dealt with before the conception of the

project. Both social responsibility and justice may be enforced by the state through laws, regulations and professional guidelines such as those that I have already discussed and analysed in the previous chapter. South Africa's legal and regulatory framework for hESC research and therapy still has loopholes, although this may be both good and bad. Good in the sense that there is still room for improvement before hESC research and therapy fully mature in the country and continent as a whole. Bad in a sense that if it is left as it is at the moment, there could be consequences that we as South Africans will suffer in the long run.

In this chapter I will discuss two additional ethical theories which are: the Ethics of Responsibility and the Ethics of Social Justice, in order to analyse the SA laws, regulations and professional guidelines regarding hESC research and therapy. I will use these ethical theories, as well as the Ethics of Ubuntu, to propose a policy framework concerning hESC research and therapy in South Africa that promotes social responsibility and social justice in a manner South Africans can understand and relate to.

6.2 ETHICS OF RESPONSIBILITY

Science and technology have brought many ethical controversies and issues relating to how new technologies affect and influence society at large. This has created a close link between ethics and social responsibility (Wilson 2000, p. 12). Moreover, these new technologies have changed our outlook on traditional ethics as they have changed how we act (having propelled us into a new way of doing things which may not be regarded or perceived as morally

obvious or acceptable), and since ethics are concerned with how we act, a change in human action calls for a change in ethics as well (Jonas 1984, p. 1). The same author suggests certain questions that could be asked concerning these new technologies, and that answering these questions will guide us to act in an ethically responsible manner. Questions such as: "how does this technology affect the nature of our actions?", and "In what way does it make acting under its dominion different from what it has been through ages?"

Jonas (1984, p.1) further states that "the power of modern technology forces upon ethics a new dimension of responsibility which was never dreamed about before". I will therefore introduce and discuss the Ethics of Responsibility as originally put forward by the German philosopher Hans Jonas, as well as discuss how this ethical theory, as well that of Ubuntu, can be applied to hESC technology. According to Jonas, the Ethics of Responsibility "must deal both with the rational ground of obligation, that is, the validating principle behind the claim to a binding 'ought' and with the psychological ground of its moving the will, that is, of an agent's letting it determine his course of action. This is to say that ethics have an objective side and a subjective side, the one having to do with reason, the other with emotions" (Jonas 1984, p. 85). However, this is not so with traditional ethics, which mainly deal with reasoning and not so much with emotions. In addition, Jonas states that for a person to use his/ her power, that individual must first have the feelings of responsibility towards others. Feelings of responsibility being vital in order for an agent to act and use the power of this new modern technology in a responsible and moral manner. Moral or ethical guidelines alone do not make an individual act responsibly towards others.

Feelings of responsibility towards others bind the subject to the agent and makes us act on its behalf, and these feelings are determined by our values and / or virtues (Jonas 1984, p. 90). Based on my study and focus, the moral values or virtues that can be learned and applied in order for the agent to act ethically responsible could be those from the Ethics of Ubuntu, since Ubuntu requires that a person acts responsibly towards his/ her community or others, which is something I have already mentioned in Chapter 4. This is supported by Chuwa (2014, p. 34) who states, "the concept of reciprocity (this being one of Ubuntu's virtues and values) of care, fostering of this virtue occurs through personal acceptance and assumption of duties and responsibility in society". Acting responsibly means that the agent has taken accountability for his/ her actions and decisions whether 'good' or 'bad' (Nortjè 2007, p. 128). Therefore, that agent is liable "to be held accountable for whatever decision is taken on the basis of the assumption that reason can be provided, that these decisions have been thought through, even though they might be fallible". Within this concept, the question 'why did I do it' is a question that everyone is obliged to answer, as all persons are to be held responsible and accountable for their actions (or lack thereof). The Ethics of Responsibility requires that everyone is accountable for their own decisions no matter what the consequences, and that one should be able to give reason for his/ her actions. This approach does not only allow the moral agent to act in an ethical manner, based on the ethical principles, rules and guidelines, but to take responsibility for his/ her own decisions and actions. Moreover, the Ethics of Responsibility leaves room for both the 'success' and 'failure' which may result from this technology and the decisions made both present and future, and to have morally justifiable reasons for our actions whether the results are 'good' or 'bad'. This contrasts with traditional ethics which require that we first look at the greater good which could be promoted by the use of the technology before we can use it. By this

traditional view, if a technology seems to have more 'risk' than 'benefit', then we ought to disregard this technology and prohibit it.

However, laws, regulations and professional guidelines only look into matters and ethical issues surrounding the moral status of the human embryo and not necessarily its effect on the current or future generation of those who are living. There is no foresight within the legal regime, thus applying the Ethics of Responsibility may help to broaden sources that may be used for hESC research and therapy. If it is further supplemented by the ethics of Ubuntu, which are community orientated and require that "assumptions of responsibility towards others transforms one from the *it* (status of early child-hood) marked by an absence of moral function, into the personhood (*umuntu onobuntu*) status of later years marked by a widened maturity of ethical sense- an ethical maturity without which personhood is conceived as eluding one" (Chuwa citing Menkiti 2014, p. 37-38). The values of Ubuntu will ensure that ethical responsibility is met by those who make decisions about or are involved with hESC technology and that this responsibility will not be based on their own feelings but on the responsibility they have toward the community. The current legal framework for regulating hESC technology is not based entirely on the needs of the community but rather on 'assumptions' arising from the moral status debate, that are not necessarily applicable within an African context. South Africa should not base its hESC laws, regulations, and professional guidelines on fears or hopes, but should rather evaluate both and arrive at a resolution on how they may be applied responsibly and ethically. Additionally, a proper introspective of the country's needs must be evaluated and policy makers must be able to identify how such a technology can be applied in an ethical, responsible manner by incorporating both the Ethics of Ubuntu and those of Responsibility. The combination of the principles, used appropriately, can assist in achieving this resolution and bridging a gap that the legal and regulatory regime

has not yet been able to. In addition, the Ethics of Responsibility are based on a futuristic outlook (Nortjè 2007, p. 129), extending towards toward the future, as do the Ethics of Ubuntu.

The decisions taken now on these matters will not only affect this generation, in the here and now, but also future generations[14]. Therefore, lawmakers must consider the moral effect harvesting an embryo for hESC research and therapy will have both immediately, and in the future, in order for the legal and regulatory framework to facilitate an environment which will promote ethics of responsibility towards society or humanity. Furthermore, consciously or unconsciously, our decisions and actions will affect not only humanity but also the environment, and we must not take actions that would be detrimental for future generations, ecologically speaking. How we exercise our power through science and technology has an effect and influence on future generations, for instance, soil science has brought about many great discoveries on how to manipulate the soil for our own benefit. But that process has also changed the same ecology that we need to maintain and harvest fruits or plants. Some improvements seem to have come with 'negative' effects that were not considered or foreseen by previous generations. Being mindful of the future generation and how our decisions and actions may affect them is very important. The issue of procreation is chief amongst the worries raised by hESC research and technology. This is especially so in African communities where procreation is viewed as a continuation of societal existence and children are considered to bring about immortality of their parents, therefore the chain of child bearing must continue (Chuwa 2014, p. 42).

[14] Whether it is possible for us to have moral obligation to future generations is a debatable matter for which it is outside of the scope of my thesis. But, in my opinion if these matters are not resolved future generation's access to healthcare may also be affected because scientific growth and development would have lagged behind.

It is also important that equality, freedom and respect are maintained no matter what our decision is concerning this technology. Based on my understanding, for human dignity to be protected and for an individual to be truly respected, the legal and regulatory regime must be able to facilitate an environment or build infrastructure where different health care options will be made available to everyone. All individuals within a society, no matter what background and class, should be able to choose from these therapies. Research and development can address certain disorders, diseases and shortages in medicinal products and devices required by the community, which would then enable an individual to be able to make ethical and morally justifiable decisions concerning their health. The law, regulations and professional guidelines must facilitate such, particularly regarding hESC research and therapy, if these rights are to be met and we are to create a country that promotes equality, freedom and respect, not only for the current generation but also those to come. Regarding the principle of futuristic ethics Jonas states that we must not only deal with our own interests (fears and hopes) but also the interests of future generations. Therefore, the principle of futuristic ethics deals not only with the now, but extends towards the future, concerning not only human beings but also the environment and the ecology of a community.

Nortjè (2007, p.131) points out four elements of Ethics of Responsibility and says;

- It puts upon us certain obligations, which inspires us to reach for an ethic which urges people to accept their responsibility to discover the importance of truth;
- It deals with the motives, commands, virtues, ethos and morality of different kinds of ethical approaches;
- It approaches responsibility as a multi-disciplinary action which cuts across all disciplines; and

- Environmental, social and cultural values should be respected in addition to technical and economic values (which are usually the only ones in our society that receive respect).

Nortjè's above elements are a good summary of what the Ethics of Responsibility are based on and the reason why I chose it as a principle that can be applied (to either supplement or be supplemented by), alongside the Ethics of Ubuntu within the South African legal framework for hESC research and therapy. Correctly applied, the Ethics of Responsibility may teach all the different subjects or stakeholders from different disciplines involved in hESC technology to act in an ethically responsible manner and have morally justifiable reasons for their own actions and decisions. Usually such individual's focus is on the research work, therapies or the profits that can emanate from this technology and not on social responsibility.

This enable hESC stakeholders from different disciplines to take responsibility for their own decisions and actions towards society, and to make decisions with cultural and social sensitivity. Since this research may be performed by individuals from different cultural backgrounds and from different walks of life, cultural understanding is required when performing or being involved in such research. Cultural understanding may also help stakeholders understand society's values and virtues. This should help eliminate the feeling of placing technical and economic advantages before human or social interests. I submit that the Ethics of Responsibility will add value to South African laws, regulations and professional guidelines concerning hESC research and therapy and that this principle should be legally enforced and taught across different disciplines, especially those in science and technology.

6.2.1 Ethics of Responsibility and hESC technology

"As regarding the ethics of stem cell research, an ethics of responsibility therefore induced us to take account of both the impact of moral principles and the question of what benefits are and will be bestowed by this research" (Nortjè 2007, p. 132). Stem cell research has given rise to new means to manipulate the world around us, means that may be seen as 'good', or 'bad. We therefore require a change in traditional ethics so that our actions will have some ethical relevance regarding this technology. Human ESC research requires that we make moral decisions on whether destruction (by whichever human embryo source) of the human embryo is conducted responsibly, and that we are able to take responsibility for our actions, whether successful or not. A feeling of duty and obligation towards society is required in order to take moral action when it comes to hESC research. Moreover, the benefits that this research may bring to humanity must be a decisive factor in our moral deliberation about the desirability of hESC research (Nortjè 2007, p. 133).

In order to elaborate on the above statement, if these actions are valuable (not only in the present but also in the future) then our moral obligation will be to ensure that this 'good' (supreme good as Jonas puts it) is realised. However, this supreme good will be used as our moral decision in order to prevent supreme evil. The question that we need to ask ourselves is what is at stake if hESC research is permitted or prohibited? How will the benefits coming from this research promote 'good' or 'evil' to the public or society? We have a moral duty and obligation toward those who exist (with the inclusion of future generation), those who are able to claim liberty and dignity in ensuring 'good quality of life' which can be maintained in the now and extend towards the future generation as well. What we decide now will not only

affect us and our future, but will also affect future generations as well, who at this moment have no say in the matter. Therefore, it is imperative that our decisions are morally defensible and would be the decisions that future generations make.

We will have to answer for how we use hESC research and therapy in order to alleviate human suffering, development of public healthcare resources, economic increase as well as scientific knowledge, as consequences of our actions will soon come to pass. As I have already mentioned earlier, the Ethics of Responsibility can be applied and enforced through laws, regulations and professional guidelines, which will guide how a moral agent may act in an ethically responsible manner for both the current and future generations. Jonas (1984, p. 98) says that "the government's responsibility is first and foremost of men for men (and of course women for women) and this is the archetype of all responsibility." By this Jonas means that the first and foremost responsibility of the State is towards those who are living. Jonas further mentions that "these responsibilities that the government has encompass the total being for their object, that is, all aspects of them, from naked existence to the highest interest". These are known as Total responsibilities. The next responsibility the government has is the responsibility of continuity, as he calls it, "which follows from the total nature of responsibility for which in a tautological sense that its exercise dare not stop". The last he mentions is called the responsibility of the future, "with future responsibility being concerned with the future (the future of the present generation as well as future generation) and this future responsibility has to ensure that technological progress is maintained throughout. Thus, the government never stops taking responsibility, and it has to look to the larger span of things extending from the past, to the present and to the future life of its community's history". Moreover, the progress that technology brings should ultimately result in the 'supreme good' over 'supreme evil'.

‘Supreme evil’ does not include ‘life sacrifice’, since human life is not the highest value compared to liberty, equality and dignity. We see this notion in history, how men and women would sacrifice their own lives in order to obtain liberty, equality, dignity and respect. Whether it be political, religious or mortal sacrifices, this has proven that human life is not regarded as of the highest value. Human beings will die and give up their lives for the sake of the ‘supreme good’ which is liberty, equality, dignity and respect (in healthcare this will result in a ‘good quality of life’). Therefore, the notion that the destruction of the human embryo for hESC research and therapy is ‘supreme evil’ is not true, nor, as some would say, immoral. People would rather sacrifice a number of human embryos provided that procreation continues and that through this action there will be improvements on the current situation faced by many who are suffering from sickness and diseases, including those suffering from infertility issues. Improvements in this research may be able to bring some scientific and healthcare benefits to aid in these healthcare issues. This is a risk that humanity may be willing to take, definitely a risk I would take not only for my future, but future generations. Moreover, in order for innovations to happen risk have to be taken. Therefore, the government, especially in third world countries such as South Africa where many are faced with many health problems and economic challenges, hESC research and therapy could be one technology that such countries may utilize fully in order to progress in science and medicine as well as economically. The human embryo is not by any means regarded as a ‘person’ in South African society, although we are not ignorant of its development and force as a beginning stage of developing a person, it is not valued above those regarded as ‘fully developed’ human beings. Therefore, it can be used for hESC research and therapy as long as this research is conducted in an ethically and social responsible manner by ensuring that it makes provisions for the maintenance of good quality health, solidarity and harmony.

It is therefore the government's responsibility to ensure that society's claims of liberty and dignity are not violated through this technology and this can only be achieved through laws, regulations and professional guidelines; Laws, regulations and professional guidelines which currently do not apply the Ethics of Responsibility regarding hESC research and therapy in my view. If this approach is applied in the context of hESC research and therapy, there will be no need for so many lacunae, and the law being too vague in terms of this technology. What the law, regulations and guidelines need to enforce is some ethical responsibilities towards hESC research itself, as well as the therapies arising from this research, in order to ensure that scientists and other stakeholders are able to make ethically and morally justifiable decisions. Social responsibility is realised and maintained by ensuring that this research and therapy is not only for technical and economic reasons, but societal benefit as well. The Ethics of Responsibility will ensure that society's interests will be maintained as well as their respect, freedom, equality and dignity of individual's within that society.

6.3 SOCIAL JUSTICE: JUSTICE AS FAIRNESS-THE PRINCIPLE OF SOCIAL CONTRACT

"Social justice is an extension of morality out to the societal level with the programs and laws that social justice activists endorse, aim to maximize the welfare and rights of individuals, particularly those whom the activists believe do not receive equal treatment or full justice in their society" (Haidt & Graham 2007). The same authors further state that "if social justice is just morality writ large, it follows that opposition to these programs must be based on

concerns other than moral concerns". Thus, social justice is mainly based or focused on political philosophy and trying to get to political agreements between different political ideas which may result in a conflict between claims of liberty and claims of equality within a democratic society. "The practical aim of justice as fairness is to provide an acceptable philosophical and moral basis for democratic institutions and to address the question of how the claims of liberty and equality are to be understood. Furthermore, that the most fundamental idea in this conception of justice is the idea of society as a fair system of social co-operation over time from one generation to the next" (Rawls 2003, p. 5).

This idea of justice as fairness is important for implementing biotechnology innovations such as those emanating from hESC technology. In order to ensure that the claims of liberty and equality within a democratic society are maintained, not only with the present generation, but also future generations. To have an understanding of this, policies, laws, regulations and professional guidelines should be designed and implemented in a way that space and time (whether past, present or future) will be able to maintain and promote justice from this technology. John Rawls' approach on justice as fairness consists of two principles, which he proposed be applied as rules for governing society. A hypothetical party would accept this, provided that they are placed behind a veil of ignorance that prevents them from knowing what they are in the society they are forming (Resnik 2011, p. 206). This is done in order to propose a society of cooperation between citizens regarded as free and equal. These principles include: "(i) each person has the same indefeasible claim to a fully adequate scheme of equal basic liberties, which scheme is compatible with the same scheme of liberties for all and (b) social and economic inequalities are to satisfy two conditions, first they are to be attached to offices and positions open to all under conditions of fair equality of opportunity and second they are to be the greatest benefits of the least advantaged members

of society (the difference principle or maximin principle)" (Rawls 2003, p. 41-42). The first principle covers the constitutional essential and the second principle requires that fairness and equality of opportunities and social and economic inequalities be governed by the difference principle (Rawls 2003, p. 47). The first principle is important for the application of laws, regulations and professional guidelines, more so for third World countries where there are many inequalities. The second principle is important with regards to therapies and the exploitation of patents through commercialisation, as well as distributive and allocative justice regarding these therapies.

Therefore, it is important that any political judgement for implementing justice within a society analyses all sides of the technology, and there must be careful reflection before coming to any conclusions to ensure that everyone in a constitutional society agrees with it. Within these agreements the two principles of justice as fairness should be applied in order to make the policy, laws, regulations or professional guidelines result in promoting social justice. Human ESC has however brought about different points of view and disagreements on how this technology should be applied, without any ideas on how it may bring justice or not. South African hESC policy makers should consider all the different sides of the arguments and come to a conclusion that will be ethically and morally justifiable by promoting social justice for present and future generations. For this to happen John Rawls' principles of justice as fairness should be observed and applied within South Africa's hESC legal framework. Thus, if issues regarding social justice are not addressed early on, before this research starts taking off in South Africa, these issues will only exacerbate all the ethical issues concerning the moral status of the human embryo that are already surrounding this technology, as well as the morality issues related to hESC patents. Morality protects human beings from unethical and/ or immoral actions which may result in citizens within a society's

claims of liberty and equality being violated. Moreover, Haidt & Graham (2007) adds that "both justice and care mattered only insofar as they protect individuals", individuals within a democratic society. Therefore, in order to protect individuals within a democratic society the government has to put in places policies, laws, regulations and professional guidelines that will provide for such an infrastructure and legally binding too.

In support of the above statement John Rawls also mentions that the two principles of justices and fairness are not enough to realise justice as fairness, and thus a moral principle is required to supplement this principle. He proposed that the principle of utility, or average utility and the principle of reciprocity be used to supplement the principle of justice. The principle of utility states that "the institutions of the basic structure are to be arranged so as to maximize the average welfare of the members of society beginning now and extending into the foreseeable future" (2003, p. 98). However, he further argues that this principle may not be enough, and hence the proposal of an additional principle: the *principle of reciprocity.* When both principles are applied to the ethics of justice, this will result in a society's regime being just and fair. Therefore, since some of the virtues or values of the Ethics of Ubuntu are utility and reciprocity, with reciprocity not only including reciprocity of care but also solidarity and harmony, the Ethics of Ubuntu can be implemented (as a supplementary moral principle) together with the principle of justice in order to satisfy justice within a democratic society. I will use the Ethics of Ubuntu as a moral principle, apart from the more obvious reason that the scope of my study is based on this principle that can be applied both locally as well as globally. Additionally, this principle can be used together with the Ethics of Responsibility as mentioned above in order to regulate hESC technology in South Africa. Therefore, it is a suitable principle that may be applied to supplement both the Ethics of Responsibility and the Ethics of Justice as Fairness. It will help to not only foster feelings of

responsibility, but to also foster justice as fairness within a democratic society. Even though Ubuntu recognises justice, it understands justice within a society through harmony, with harmony being understood and realised when everyone is able to not only live in a just and fair society, but live together (interconnected, solidarity and in unity) or in agreement with the individuals and community's decisions and goals, this resulting in justice for all. This being the basic meaning for harmony in an African perspective. Thus, hESC research and therapy laws, regulations and professional guidelines should not only bring about justice, but harmony for South African citizens (this extending to African and global citizens) and therefore, Ubuntu as a moral principle will have to be implemented together with the principle of Justice as Fairness regarding hESC technology's policies, laws, regulations and professional guidelines.

I will further address the principle of harmony later, but first I will analyse certain issues regarding biotechnology innovations, related to hESC technology, concerning social justice. These issues have not been analysed directly concerning hESC technology as of yet, but do relate to it since they are generally based on biotechnology matters that relate to justice and, may be important to be address for future references.

6.3.1 Principle of justice and hESC research

Based on the two basic principle of justice as fairness, hESC research should not offend or violate citizens' fundamental, moral and legal rights. The individual's moral power is their claim to liberty and equality, which are based on the individual's constitutional rights. Laws,

regulations and professional guidelines should promote these claims and ensure that individuals' moral and legal rights, which are based on the country's constitutional regime, are not violated. In order to bring about fair justice within a democratic society when the legal regime is applied, both the above two claimed moral powers must not be violated. However, if it so happens that when these laws, regulations and professional guidelines are applied one or both of these claimed moral powers are somehow violated, it will result in inequality and unfairness within that democratic society.

One would therefore have to ask: Do the laws, regulations and professional guidelines regarding hESC research and therapy in South Africa violate these claimed moral powers? (Of course extending to Africa as well, seeing that South Africa with its well-developed infrastructure can be used as a scientific hub for research and development of therapies for the entire continent). The legal regime concerning hESC technology has not been shown or proven to violate any constitutional rights of the human embryo used (or lack thereof) for this research or, most importantly, those of the donors, participants and patients. Moreover, I have argued that the human embryo does not possess a 'higher' moral status based on both the Western and African moral principles versus the other stem cell alternatives such as ASC and hiPSC.

Therefore, based on my previous arguments, in order for the legal system to promote and maintain society's claimed moral powers and not violate their rights, it will need to accommodate hESC research and therapy as part of its legal regime in the same way it does with other stem cell alternatives. This will benefit the Republic's citizens in the future as a broader range of stem cell treatments may be better suited for public healthcare, based on

suitability and cost, especially for those coming from poor and disadvantage backgrounds. Prices concerning these stem cell therapies will differ based on the source, technique applied for development as well as patent and commercialisation issues. Therefore, the legal regime needs to take all these matter into consideration if it is to enforce justice as fairness regarding hESC research and therapies.

Therefore, whatever the laws, regulations and professional guidelines that do not promote and develop conducive and friendly environment for this technology to grow and progress will be a violation of society's claimed rights and liberty and thus, unethical. This is currently what we see within South Africa's legal framework regarding hESC research, though the same legal system has made allowance for alternative stem cell technologies to flourish within the Republic. This creates a vacuum for the type of potential therapies that will be made available for public healthcare. This legal framework violates the first principle of justice as fairness, as the legal system will not promote equal distribution of fundamental moral and legal rights within society by restricting or prohibiting certain parts of this technology that may be beneficial for South Africa's society or to public healthcare. The issues and concerns regarding justice as fairness resulting from hESC research and therapy in South Africa arise from the fragmented laws as well as loopholes within the law. Moreover, there are no specific guidelines that regulate, or address and deal with matters regarding hESC specifically. This is important to have as the absence of such laws in South Africa creates a vacuum, not only in science and technological advancement, but also for resources that could be used to benefit the public healthcare system. Such a legal framework does not bring justice as fairness, nor does it facilitate growth. South Africa's legal framework for hESC research and therapies can be argued, in this case, to be morally unjustifiable, in that they allow only those alternatives stem cell technologies to develop. This without consideration of how all these stem cell

technologies (as a whole) can bring maximum results through their different applications such as; in research studies, alleviation of disease and market prices of these therapies and medical devices. Within these stem cell technologies one stem cell technology, hiPSC, may be beneficial in one study or therapy whereas another, hESC for example, may be with another study or therapies. Therefore, a much broader evaluation of stem cell technologies need to be addressed and decisions made based upon such considerations, including technical and/or manufacturing evaluation, clinical benefits (potential thus far) as well as economic benefits. By also assessing how prices may differ and how this may affect the public and access to public healthcare. Currently as it stands it appears as though the law favours (probably by default) these other stem cell alternatives versus hESC. It is vital to carefully weigh all the hESC arguments and reflect upon them in order to maintain and develop justice as fairness within a democratic society for the community. The legal framework has to facilitate through equal opportunities these stem cell technologies and not disregard hESC based on the destruction of the embryo and moral status. Especially if the moral status of the embryo is not of a concern based on Ubuntu, to not allow this research in its fullest potential is unjust.

Access to stem cell therapies by the public healthcare sector- and everyone, both poor and opulent individuals from across borders- is very crucial because this research has to somehow bring about the potential benefits that it promises to bring. However, how distribution and access of those benefits will be maintained and achieved will have to be determined by the same laws, regulations and professional guidelines. For instance, depending on what the legal and regulatory regime permits or prohibits, as is the case with South African laws, regulations and professional guidelines that favour ASC over hESC, may have South Africans facing certain consequences at the end. For example, if hESC technology grows and produces

scientific and healthcare benefits in other international countries which have liberal legal and regulatory regimes and we as South Africans suddenly cannot access or afford them, we will have to rely on other countries for these therapies. This will pose not only scientific problems (as there will be no progression) but will result in injustice regarding availability and accessibility of public healthcare resources. This will always put us at the mercy of these countries when this is unnecessary since the moral status of the human embryo for hESC technology is not an issues. This would be unjust not only to this current generation but to future generations as well.

The saying, "prevention is better than cure" would be better followed to prevent the above from happening. Therefore, as a country we have to start implementing and facilitating an environment where we would be able to develop therapies through South Africa's scientists in South Africa and for South Africans (of course I am including Africa as a whole in this regard). As a country we cannot rely on other nations for our own scientific growth and health and we must take control and be in charge of our own scientific knowledge, as well as healthcare issues and resources. Therefore, prohibition or restriction of hESC research and therapy by South African laws, regulations and professional guidelines is unjust as it will violate society's constitutional rights and/ or claimed moral power.

In the next section I will discuss how justice as fairness can be affected by IPR, through patents and issues concerning hESC therapies akin to those of other biotechnology innovations.

6.3.2 Justice, Patent and Therapies

IPR is a form of patent that promote scientific and technological progress by giving financial incentives to inventors and entrepreneurs. (Resnik 2011, p. 198). “The strength of IPR may be an important ingredient in a country’s ability to attract life scientists and the private funds to support them, but especially in Canada and other countries (such as SA) whose domestic markets are relatively small” (Schrecker 2013, p. 3). Being that such countries may suffer economically if they do not allow patent on higher life forms, i.e. hESC patents, and may result in creating the impression that such countries are unfriendly towards biotechnology. This impression of not favouring and not allowing patenting of a biotechnology innovation as seen with some parts of the professional guidelines (previous chapter) for hESC research & therapies may be deemed by other international trading partners as being unfriendly to hESC technology making this unattractive to international collaborations and investors concerning hESC research. Biotechnology patents have been perceived as being contrary to morality and a violation of human dignity, hence patents from certain biotechnology innovations are legally prohibited, i.e. hESC patents, in certain countries, specifically within Europe, by the E.U legislations based on this trend of thought.

However, prohibition of hESC patents does not mean that justice to the public is served and attained by these ‘harsh’ legal regimes. The South African Patent Act, 1978 (No. 57 of 1978) permits granting of any patent based on (a) legal status- new invention, inventive step and trade or industrial or agricultural application, i.e. utility, and (b) morality of the invention or patent- as stipulated in clause 25 (4) (regarding the invention itself) and clause 36 (1)(b) (regarding commercialisation of patent or invention). I will first analyse the effect and how

the principle of justice can be applied to hESC patents without violating the two principles of justice and ultimately the two moral powers of liberty and equality. Rawls states that in order for justice as fairness to be obtained these two principles of justice are important. The principle of justice concerns itself with the principle of equality and the difference principle. In order for the principle of equality to be gained the law must make provisions and facilitate an environment of growth and development for hESC research and therapies versus alternative stem cell technologies based on ethically and morally justifiable reasons. For instance, if other stem cell innovations are patentable through the legal system the same should be allowed for hESC innovation. Legally of course hESC research and therapy are patentable based on the standard patent criteria. However, issues concerning *ordre public* and morality relating to hESC patents is what will need to be addressed (I will later address this issue below) as these issues may slow down or halt research and therapy regarding this technology. Moreover, morality issues are the same issues that E.U legislators have used in order to prohibit hESC patent from being commercially exploited.

Concerning *ordre public* and morality clause, patents should not be granted to any innovation, no matter what it is, without consideration to morality as morality helps protect society. Therefore, it is imperative that hESC patents are not offensive to *ordre public* and morality as this research has been under a lot of ethical scrutiny, and with the E.U legislation also prohibiting hESC patents this has raised contentious issues, ethical concerns and awareness. Whether or not South Africa should follow suit (follow E.U. legislation) by using the *ordre public* and morality clause within its own patent system is a question of concern. Also in debate is if South Africa should rather come up with its own legislation regarding hESC patents, without prohibiting hESC patents and the commercial exploitation of these patents, and whether such legislation will be suitable for the country. Moreover, it will

require that policy makers and legislators be able to determine what guidelines, rules/ principles and laws will be applicable to them to allow for such. These morality issues are of a vital concern, especially when it comes to hESC technology, and these issues need to be dealt with and addressed appropriately and in depth without any bias or arbitrary decision concerning this technology. The decision should not be based on how one feels or on one's religious point of view or what their desires are regarding the moral status of the embryo itself. Therefore, there is a need for policy makers who will be able to see and make these distinctions based on what is right or wrong, good or bad, moral and immoral regarding hESC inventions and commercial exploitation of their patents. How one feels concerning the moral status of the human embryo should not be a standard guideline for the morality of these hESC patents and inventions.

South Africa as it stands has not had any patents (from any innovation) which have been reported to be rejected based on the *ordre public* and morality clause, unlike within the E.U countries. Furthermore, the patent officer and court's interpretation of what may be regarded as novel, inventive and industrially applicable innovations is based on their subjective perceptions of those criteria which may influence or allow patents that may result in offending *ordre public* and morality as stipulated in section 25 (4)(a) of the Act. When it comes to Biopatents, being able to determine what a novel, inventive and industrially applicable invention may be challenging, especially for the patent officers and courts. Those currently making these decisions are usually legally trained, and being able to foresee that an innovation at hand is novel, inventive and industrial applicable can be challenging as they may not be familiar with the techniques applied, but only aware of what is legally required. What may be an obvious step to a trained and skilled biotechnologist or scientist may not necessarily be so to a patent officer and court. Therefore, for these patent officers and courts

it may be challenging to adequately foresee and examine what could be regarded as a technical advancement in stem cell research and therapies. In addition, concerning patents utility, that is, how that particular inventions will result in a commercial product in the foreseeable future, it may be challenging for them to foresee how it could become offensive to public's morality in the future.

However, all these are legal issues (not so much ethical issues although they do indirectly affect the morality issues of patents) which may result with some of the hESC patents promoting unfairness and injustice and/ or resulting in the revoking of hESC patents which may be an unjust and unfair act. An example of such a patent is the Wisconsin Alumni Research Foundation (WARF) regarding the *in vitro* cell culture of hESC. This patent was initially filed by James Thomson in the USA who isolated and maintained human embryonic cell culture in the laboratory, and based on this Thomson filed for patent application for his work for which he was granted three patent titles for "primate embryonic stem cells". These patents were later assigned to WARF, however, there have been issues regarding inventiveness and industrial applicability of the patent and these patents have also halted downstream research due to exclusivity rights and licensing fees. Based on this, Thomson's patents have been perceived to be unfair as they are blocking other researchers from making use of information pertaining to them. Additionally, the inventive step is perceived to be obvious to an individual who is trained and skilled in that field. Now these patents are reported to be blocking other research studies that may result with potential scientific knowledge (which may be used in the future to develop therapies or medical devices) or health and healthcare benefits and based on the above reasons this is perceived as being immoral and unjust.

As a result of the lack of knowledge on that particular state of the art, patent officers and courts may grant patents such as the one that was granted to Thomson, which may block other researchers from making use of this knowledge or patents downstream through exclusivity rights and through high licensing fees, even though there may be commercial purposes from those patents. I will not be going into too much detail with the legal issues concerning hESC patents as this is not part of my study, I merely want to point them out as they do affect and may influence issues regarding *ordre public* and morality downstream, or result in these patents being offensive to public's morality. However, there are patent exceptions which can be applied within the patent regime in order to mitigate all these concerns and issues and make provisions for the granting of patents that may not be offensive to *ordre public* and morality. Additionally, it may also be best that an examination system, guidelines and tests for these legal criteria be incorporated within the patent regime for the same above reason.

Another equally important ethical concern regarding hESC patents is that of ownership just like with any other biopatents. Biopatents are often viewed as patenting life, which will be more so with hESC patents as their starting material is a human embryo, for which the information or procedure or medicinal device will be patented by either the researcher or stakeholders and/ or collaboration thereof and this may be perceived as immoral and unjust. Patenting of biological materials does seem to be against what is usually viewed as just and ethical, since it seems as though human life is being patented and the patentee or patent owner now has ownership over that particular individual through his/ her patent. For instance, with regards to the human embryo, the ownership of that embryo may belong either to sperm or oocyte donor or both or neither in some cases, even though they have donated their biomaterials to be used for the creation of this particular embryo. Thus, if it happens that this

embryo was donated for hESC research or the sperm or oocyte for the same research purpose and suddenly scientific knowledge or therapeutic devices are developed from this particular embryo or gamete donations, which is further patented and that patent exploited, then some might think that the donor(s) would also be part-owners of the patent.

However, previous cases on biomaterial ownership (mentioned in Chapter 3) have shown to be the opposite of this view, which has bought about a lot of social concern regarding biopatents, because these patents usually lead to commercial products from which the donor(s) of the biomaterial were excluded from the profits or royalty fees. Hence, ownership issues from such patents arise primarily because of the possibility that these biomaterial samples which are donated for biotechnology research, including hESC research and therapy, may have some commercial value even if not in the initial stage (Godard *et al* 2003, p. 97). As was already mentioned earlier in chapter 4, according to Ubuntu, patents may be perceived to be immoral and unethical in South African communities being that the values or virtues of Ubuntu hold that no individual can own that which belongs to another person and hence the community. It is a taboo and perceived as greed and not possessing Ubuntu which is fundamental within South African societies.

Therefore, researchers, biotechnology companies, universities or the government may not have 'sole' ownership of an individual or community member's gametes or human embryo, and the only way to salvage this issue is by ensuring that there are benefits that are being shared with those individual donor(s) or communities from these patents and commercial profits, which is for the edification and growth of the community and will promote solidarity, justice and harmony. I need to mention this once again to clarify how biopatents (as with any

innovation that patents anything that is from nature) are perceived in a South African context and how this can be resolved in order to make such patents ethical and morally acceptable in a South African context. It is important to understand and realise that when an individual or communities participate in such research work they are of the understanding that this will be of their benefit and they are sharing what belongs to them in order for that particular researcher or biotechnology company to find resolutions and answers that will be beneficial to their communities, people and societies. They share because they care for their own individuals and communities (both present and future) and finding out that the researcher will 'own' their samples would seem an act of slavery and colonisation by those researchers and companies involved, which is totally against the values enriched within South African societies. Therefore, it is advisable that these researchers, biotechnology companies, universities or government be regarded as custodians or stewards of these biomaterials and not necessary the 'owners' of such.

However, as already seen in the previous chapter (Chapter 3), sperm / oocyte/ human embryo donated for research or therapeutic purpose belongs to the government with the exception of cord blood samples which belong to the parent of the child. This law goes against the beliefs of the South African peoples (based on Ubuntu as a core principle that they live by on a day to day basis) and this law may lead be offensive to *ordre public* and morality. South African societies do have an interest in their own biomaterials as well as their land, plants and animals, even though this may not always be realised by outsiders. There is a sense that if their interest is threatened somehow (by someone seeing as 'owning' their biological materials) this may cause social injustice (i.e. disharmony), and this will be the result of an invention or commercial exploitation of a patent, thereby making that patent contrary to public's morality. Note that the same is also true if they are aware that the working or

exploitation of a patent may provide clinical benefit and this is withheld from them by the Republic through the legal framework.

South Africa's legal regime has to learn from international cases, cases such as those of *Moore vs Regent of the University of California* and the *Davis vs Davis* case to avoid issues such as offending public morality through ownership of these biopatents. Who owns these biological materials, especially sperm/ oocyte/ human embryo is vital when it comes to hESC patents and we need a hESC legal framework that will include this specifically, not a framework that addresses IVF or others and indirectly address ownership matters of gametes and embryos. In *Davis vs Davis* case, Obasogie & Theung (2012, p.61) reports that "a 1992 opinion from the Supreme Court of Tennessee was, one of the earliest judicial opinions to consider the proper disposition of frozen embryos held in a fertility clinic where there was not any pre-existing agreement or contract to determine how unused embryos should be handled. The genetic parents, Mary Sue and Junior Davis, divorced; Mary Sue initially wanted to gestate the embryos and then wanted to donate them to an infertile couple while Junior wanted the embryos to be discarded. Not only did the couple not stipulate what should have happened to any of the unused embryos prior to their divorce, but there was also no relevant state statute to determine the embryos' fate, thus, the court examined a number of scientific, ethical and legal perspectives to determine how to proceed" with this case. The Davis case is said to be important by Obesogie & Theung (20102, p. 61) based on "the courts' reasoning on whether embryos are "persons" or "property" in determining progenitors' rights with regards to their disposition in the absence of any contract or other agreement. The court concluded that embryos *'are not, strictly speaking, either "persons" or "property" but occupy an interim category that entitles them to special respect because of their potential for human life.... [the Davis interest] is not a true property interest. However,*

they do have an interest in the extent that they have decision-making authority concerning disposition of the pre-embryo (embryo)'". "Thus, the Davis court case distinguished that the property interest an individual might have on an embryo from other types of excised somatic cells and tissues, is largely based upon the "potential for human life" or capacity to develop into an autonomous human being", that the embryo may possess versus the other somatic cell or tissues (Obasogie & Theung 2012, p. 62). This case and other similar cases (also reported by Obasogie &Theung 2012 in their work) can be used to argue or dispute issues of ownership rights or may be used by policy makers and legislators to make discretions on how ownership rights should be distributed, or how hESC patents ownership rights can be made just and fair based on these cases within South African and African societies, as well as on the Decision of the Court's Law.

Another ethical issue concerning biotechnology patents and hESC patents which also stems from ownership issues is that regarding commodifying human embryos. There are fears that these patents may result in human embryos becoming commodities, although this view may not necessarily be directly expressed regarding hESC patents as it has been with all the other biotechnology innovations, it is only a matter of time until stem cell patents and hESC patent also start experiencing the same issues and debates. 'Private' ownership of hESC patents may cause offence and be seen as violating the public's rights, and the issue of commodification from hESC patents may be perceived as placing a prize or value to human life, thereby devaluing life. As Greely (1998, p. 489) states that "the property rights of biopatents or rather human embryos may affect our view of humans and whether humans would become commodities or not". However, currently and especially in South Africa we cannot really foretell how this issue (ownership rights) will truly affect society and how acceptability and rejection of the hESC patent will proceed until we are directly faced with this issue and have

cases (domestic cases as opposed to international cases) through which we can change or make amendments to the South African patent law and regulations concerning hESC research and therapy, which will be ethically acceptable. It is always advisable that policy makers and legislators learn and use some of the international court cases as guidelines to guide them as to how and what may or may not be morally acceptable concerning hESC patents, as well as the Ethics of Ubuntu as an African moral philosophy within African societies. So that they see what values the patent system promotes in terms of Ubuntu (harmony, solidarity, care and so forth) and how this may be incorporated within this system.

Before I move to the next section I want to briefly summarise what I have already discussed in this part. I showed that justice as fairness should be maintained within the South African society (thereby Africa as a whole) and that justice is understood as harmony. I then looked at issues concerning IPR of hESC, and how granting hESC patents that may indirectly affect *ordre public* and morality. These include the other three patent criteria which are legally based, unlike with the morality clause. Furthermore, I briefly showed how these criteria may affect hESC patents and how unfair patents may be granted by using the WARF's patents as an example. In addition, I discussed and analysed issues of ownership and how these issues may also offend public morality, especially within African communities, based on the beliefs and cultural understanding of ownership. I showed that it may be better to consider patent owners as custodians or stewards as this may be a better and more accepted term to be used. Another issue that arises through ownership concerns patent commodification. I discussed how these issues can be addressed in an African context and how such issues, if not appropriately dealt with may have negative consequences. Thus, policy makers and legislators need to draw guidance from international cases and use Ubuntu to draw up and

implement a legal framework concerning hESC patents, and I submit that this is currently lacking within the South African Patent law.

In the next section I will look at issues regarding the last clause or criterion required in order for a patent to be granted to a patentee, the issue of *ordre public* and morality found in both section 25 (4) (1) and 36 (1)(b). This clause is very important as part of my scope, since I am normatively analysing the laws, regulations and professional guidelines concerning hESC research and therapy, seeing that this research and therapy already has ethical issues regarding the moral status of the embryo. In addition, E.U legislation has prohibited industrial or commercial application of any patents from hESC research based on this clause, for which they have an examination system and guidelines to examine these biopatents, unlike with the South African patent system. The TRIPS Agreement (of which South Africa is a signatory) has made certain suggestion including that member countries may revoke patents based on the morality clause, and seeing that the South African patent Act does include this clause and can revoke a patent based on it, it is important that I discuss this clause, and how it may effect and affect hESC technology as well as allow the legal framework to be ethically acceptable. Furthermore, this clause is very important for hESC research and patents as it may either slow down or block research in this field or be used to revoke some patents concerning hESC which may regarded as being offensive to *ordre public* and morality without proper examination and a moral justifiable reasons for such a decision.

6.3.3 *Ordre Public* and Morality

The South African Patent Act, 1978 (No. 57 of 1998) contains a moral clause and grounds for not granting an individual seeking property rights over the subject matter or invention This moral clause is found in section 25 (4) (a) and 36 (1) (b). Section 25 (4) stipulates that "A Patent shall not be granted – (a) for an invention the publication or exploitation of which would be generally expected to encourage offensive or immoral behaviour". Section 36 (1) stipulates that "Power to refuse applications in particular cases - (b) that the use of the invention to which the application relates would be generally expected to encourage offensive or immoral behaviour, he shall refuse the application". How effective this clause is and on what grounds or guidelines it is based is unclear from the laws, regulations or even guidelines. There are no regulations or guidelines that supplement the South African patent Act, as of yet. There are no guidelines or rules in this clause about what would be described as immoral and offensive to the public. Thus, judgement is purely based on the patent officer's and court's discretion, which is concern as these individuals may not have an ethical or philosophical background which is necessary in order to evaluate this clause. This is becoming more important especially regarding hESC patents with the E.U having stipulated that hESC cannot be patented because they are against *ordre public* and morality. This raises some concerns as to how this may be addressed in South Africa, and if it is true that hESC are offensive to public's morality. Within the E.U legislation both the Biotech Directive and European Patent Content Convention (EPC) help define what falls under this clause by stipulating the moral rules and guidelines that may be used to exclude patentability of a subject matter, especially those from biotechnology innovations. According to the Biotech Directive, inventions are considered unfit for patent if their commercial exploitation would be against *ordre public* and morality (Soini, Aymé & Matthijs 2008, p. 18).

Based on that statement, an unpatentable invention as Article 6 (c) of the Directive states, includes the use of human embryos for industrial or commercial purpose thus, not prohibiting hESC research, but industrial application for commercial purposes. Apart from the E.U, the TRIP Agreement also made the same provision for TRIPS members that they may exclude from patentability inventions whose commercial exploitations are contrary to *ordre public* and morality. With that said, it is important to understand what the term *ordre public* means, with the old legal concept of *ordre public* being reported to refer "to the protection of important public interests such as security, peace and democracy" (Soini, Aymé & Matthijs 2008, p. 18). According to the South African Patent Act, 1978 (No. 51 of 1978) section 25 (4) (a) exploitation of an invention by a patent may be based on the manufacturing process of that patent in that state of art. An example of such a patent is the case between the *Consumer Watchdog vs. Wisconsin Alumni Research Foundation*, in which the Consumer Watchdog and the Public Patent Foundation filed a brief with the court of Appeals for the federal Circuit. In their brief they argued that patent claims on hESC held by the WARF are invalid under the Myriad decision because they are 'products of nature'. Moreover, "an appeal was filed in a re-examination of certain patents, re-examination of patent 7.029,913 ("the '913' patent") that was issued on the 18th of April 2006 to Professor James Thomson and now assigned to WARF. The Consumer Watchdog argued that three claims of the patent for the *in vitro* cultures of human embryonic stem cell lines had been obvious in light of the prior art, with any person of ordinary skill in the art of deriving and maintaining embryonic stem cell lines for any mammal" being able to find the process used to derive these hESC lines, at least, obvious to try (Pollack 2007, p.1).

This case brings two issues relating to hESC patents under the *ordre public* and morality clause. Firstly, the subject matter or invention being patented is under question as to what

exactly is regarded as 'natural', seeing that those things that are regarded as 'natural' may not be patented. Does it therefore mean that the human embryo is not regarded as a 'natural' entity? Although what is patented is not the human embryo itself but the data or information pertaining from the hESC research or the product or therapy developed from this research work and study. Clarity on what is regarded as a 'natural' entity that may not be a patentable subject matter needs to be defined, as well as how patent officers and courts may test for patentability of naturally occurring subject matters such as those from biological materials of human beings, otherwise this may result in patents or commercialisation thereof being offensive to *ordre public* and morality. The second issue seen with this case relates to the inventive step itself which is defined and determined: by the obviousness of that process in that particular state of the art (in this case stem cell or biological), which may result in patents being issued without foreseeing that these patents and / or their commercial exploitation may cause offence to *ordre public* and morality in the future, as is seen now with the WARF patents. WARF's hESC patents are now perceived to be blocking downstream research and developmental work concerning hESC research as a whole and it seems like everything concerning processing of hESC lines is covered by these patents. When evaluating this issue one realises how these patents are against public morality since they are blocking research and therapeutic development which may be beneficial to the public. Such issues also tend to increase therapeutic costs. How scientific knowledge as well as therapies are distributed and how the public may be able to have access to the technology is of paramount importance as this is the main reason for such an invention to be regarded as being against the public's morality.

However, as Soini, Aymé & Matthijs (2008, p.19) states that "the patent legal regime is generally held as neutral, that is patent officers do not have to pay attention to the patents'

consequences, as they are not trained to do so more especially with morality issues". They further added that "an invention cannot be immoral just because some people do not like it, but only if it is deeply offensive to the great majority of the population". I agree with this statement as I think that just because the subject matter is perceived as an immoral source or entity this does not mean that hESC patents are immoral as well, or that their manufacturing process or the commercial exploitation of their patents are contrary to *ordre public* and morality. Yes it is the actions that lead to working or exploitation of patents that are contrary to *ordre public* and morality and not inventions as it is currently seen within the E.U. legislation. There should be a moral or ethically philosophical reason that justifies an invention being regarded as being against *ordre public* and morality, irrespective of the original entity's moral stand or how the public perceives it. Such moral justification should be a set of certain activities that lead to the moral agent's action being contrary to *ordre publi*c and morality and not the commercial exploitation of that particular invention's patent. My opinion is that entities can never be immoral, however how that entity and/or its invention is made used of may be justified as immoral if it violates fundamental human rights such as human dignity, freedom and equality (with inclusion to right to life). Therefore, moral agents are the ones responsible in making sure that the human embryo research does not violate these rights. Furthermore, they must ensure that commercial exploitation of their patent does not violate these right, and ensure that social as well scientific and economic justice are met. I mean if the embryo is found to be morally justifiable to be used for research and therapeutic purposes, then it is the moral agent's (researchers and patent holders) action that will need to be regulated, as to their act of using or working the patent may lead to actions of concern, i.e. be against *ordre public* and morality.

Therefore, there is a need for explict guidelines and rules that will define what the law regards as an action that will be offensive to public's morality. hESC patents will possibly block downstream research, and development work through exclusivity rights, licensing and royalty fees or commercial exploitation of the patent, resulting in unfair and unjust distribution of the therapies which is truly against *ordre public* and morality and unjust. But to say that a technology is unpatentable because how it is derived or harvested is immoral is not a morally justifiable reason to prohibit patentability of that particular technology. There must be a moral reason for prohibiting patentability of that technology because by not doing so, this on its own is against *ordre public* and morality. I say so because we are not using our foresight in evaluating and making decisions on what may happen in the future by evaluating 'all' the possibilities and ethically weighing them to come to conclusions that we are taking. And, if it so happens that we realise that this decision actually caused more damage and that it was not immoral to allow hESC patents, this will not only be devastating to us (this generation) but to future generations. There must be a serious offense to the public's morality in order for this clause to be effective and valid, and at this moment there are no guidelines or ethical reasons as to why hESC patents are against *ordre public* and morality or how they seriously offend public's morality.

Currently, E.U countries are the only ones that have prohibited hESC patents based on this *ordre public* and morality clause. I don't think there is a logical and moral reason behind this prohibition when looking at the E.U legislation and my concern is that in South Africa we may find ourselves just following suit or that this may extend to South African legal framework for hESC without having a proper ethical and moral reason that will justify this decision. However, South Africa may prohibit these patents based on the same reason as the E.U countries that hESC research is viewed as immoral, i.e. destruction of the human

embryo, and not based on whether hESC patents are immoral and unjust on their own apart from the moral status of the embryo. *Brüstle vs Greenpeace* is a recent case where a hESC patent is rejected based on the morality clause. In this case, Mr Brüstle in 2004 filed for property rights over his isolated and purified neutral precursor cells. The German Patent Court granted his application invalid insofar as it relates to obtaining the precursor cells from a human embryo and thus being against *ordre public* and morality clause. I don't agree with the court's decision since I don't understand how commercial exploitation of hESC would result in offending *ordre public* and morality. Just because 'they' perceive the use of human embryo for hESC research as immoral (based on their laws, see the chapter on international laws) this automatically results in hESC patents and commercial exploitation of these patents as being against *ordre public* and morality. This is the same analogy that Devolder and Harris (as explained in Chapter 2, section 2.2.1 page 24) spoke about, that just because something has the potential to be something it does not mean that we must always treat it as such. In this case, just because the use of human embryo for research and therapy is perceived as immoral does not mean that hESC patents are immoral and against *ordre public* and morality, one thing does not lead to the other.

South Africa cannot just follow other countries especially on issues that affect or may offend the public's morality as every country has its own set of morals values which may differ from one country to another. Unlike with the E.U countries, South Africa's (Africa) moral principles and values are based (predominantly) on Ubuntu, and Ubuntu does not see an embryo at that developmental stage as a human being, therefore the embryo is not awarded the same moral status as a 'fully developed' human being. How people feel or perceive such issues is no reason to prohibit patents on the grounds of *ordre public* and morality since ethics are not based on how people feel or by popular demand, but rather sound ethical

principles. Additionally, as long as the hESC patents do not disrupt the public's peace and democracy then such patents are not against *ordre public* and morality. What is important is to realise that this research may have some real potential benefits in the future which may be important to take into consideration and which may help alleviate human suffering and possibly result in health and healthcare benefits apart from scientific progress. What issues may result in being offensive to the public's morality will be from the commercial exploitation of hESC patents, since this may affect the market cost of therapies and accessibility of these therapies.

Accessibility of therapies and/ or healthcare benefits from patented subject matter is the second most contentious issue with biopatents such as a hESC patent. Access to these therapies has raised ethical issues concerning fair distribution of the benefits from hESC research and therapy and how these benefits should be shared in order to bring fair, equitable and just distribution amongst all stakeholders including public healthcare. There have been policies (which I will discuss in the next chapter), albeit not national but international, drafted in order to ensure that biotechnology inventions will bring about fair, equitable and just distribution and will be accessible to the public despite the individual or country's background and economic situation. Moreover, they will promote just and fair sharing of the benefits that may result from hESC research, whether it is scientific knowledge or health and healthcare benefits. Therefore, the *ordre public* and morality clause is very important mostly in promoting justice within society through hESC patents and commercial exploitation (or none in some instants) of these patents. In the next section I will discuss and focus on the benefit-sharing and justice from hESC patents, since benefit-sharing may mitigate some of the African perception regarding technologies, including hESC patents.

6.3.4 Benefit-sharing and Justice

In the interest of justice or social justice, the last decade has witnessed an emerging international consensus that groups participating in research should at a minimum receive some benefits. In this consensus the concept of benefit was often limited to the possible therapeutic benefits to these participants in clinical trials or of payments to research participants (HUGO Ethics Committee 2000, p. 1). Cases such as those of John Moore's raised some of this awareness, concerning injustice and unfairness from healthcare research, where researchers would make profits from the participant's biological material. "In the case of research – when using donated samples - it is generally assumed that the individual donor is giving his/ her biological material to further the collective good of the community rather than his/ her personal profit or the private profit of a company" (Godard *et al* 2003, p. 98). Thereby, researchers or companies investing in the research work often receive the incentive from exploitation of these IPR (patents) whereas, the participants do not receive any benefit and now this is suddenly viewed and perceived as unjust, unfair and immoral.

This has brought more and more voices to be heard in favour of benefit-sharing which means that benefits resulting from the use of biological materials including human embryo collected for scientific and medical research purposes, should in some form be returned back to society and / or the groups of people involved in research (Soini, Aymé & Matthijs 2008, p. 18). Therefore, issues relating to hESC patents need to be addressed and discussed in detail before research studies even commence. Issues such as benefit-sharing and how these benefits should or would be distributed amongst all stakeholders (this including the public), in a fair and equitable manner to promote social justice, with the principle of distributive justice

addressing these issues on how we should distribute benefits and burdens to society (Resnik 2011, p. 202). I support the concept of benefit-sharing when it comes to scientific and medical research, especially with participants and communities, since they are always left behind without even being informed on what the results or outcomes of the research were. Such feedback may be more than enough, especially in African societies where this action may simply show the respect and appreciation that the researchers or investors have towards that individual or community. However, how these benefits are distributed and allocated may be tricky and this may be an issue. Therefore, this will need to be evaluated and benefit-sharing agreements proposed concerning a feasible way forward for these different stakeholders, which will be acceptable standards for their society as well. Of course this will be difficult and challenging, however, it does not mean that it is not doable and cannot be achieved.

"Justice is central in order to protect individuals or society and the problems relating to distributive justice especially with hESC research which is already a contentious subject and may cause a lot of controversial issues in contemporary moral and political philosophy" (Resnik 2011, p. 203). The principle of benefit-sharing from hESC research and exploitation of hESC patents may be supported by many people (more so in African cultures where it is all about collectiveness) and the may possibly be a vehicle that may mitigate some of the ethical controversies and issues from this research. Even though commodification and commercialisation of the human body (human embryo) is not considered ethically sound there is a need for a more equitable approach that provides some returns to the individual and community, even with non-commercial and non-profitable research. However, these may eventually become commercialised and these researchers or companies involved may have a special moral obligation and duty to share the benefits emanating from this research. So far,

there has not been an issue concerning benefit-sharing and distributive justice with hESC based therapies since this research is still in its beginning phases and no commercial exploitation of hESC patents has happened, but it is only a matter of time. However, based on moral issues as well as previous cases such as the HUGO project, it would be advisable to follow some of the established policies or recommendations on how to distribute benefits in an equitable and just manner emanating from research which involves human biological samples. Whether this research will have commercial products or bring financial gain or not, certain benefits must be shared from it with the participants and/ or community or society. The possible kinds and types of benefits that may be shared can either be monetary and non-monetary in nature. Although, the absence of benefit sharing might be viewed as an unethical action, this should never be used as a reason for not allowing hESC research and therapies if it will benefit the overall healthcare sector. There should rather be an inclusion of standard benefits for this technology and as it grows and develops then appropriate benefits can be added through hESC policies and regulations.

Monetary benefits flowing from patent exploitation could include, but are not limited to: licence fees – in the event of a licensing of IPR to a third party; royalties – in the event of a successful commercialisation of the IPR; and the sale price – in the event of an assignment or sale of the IPR to a third party. Non-monetary benefits sharing may include (but also not limited to these suggestions); technology transfer, creation of employment or training of local people or communities, transfer of knowledge, investment in research and development (WIPO 2013, p. 21-22). Just as with any other biotechnology involving human participants and donors, hESC research and patents have to make provision for benefit-sharing with participants, donors and society as well as what and how these benefits will be equitably and fairly distributed. Additionally, and very crucially, is that both monetary and non-monetary

benefits must be included and not just one without the other. This will ensure social justices as fairness. But unfortunately as it stand currently, the SA patent law has some loopholes in that it has not accomodated benefit sharing nor the methods for how public morality is determined and analysed.

6.4 CONCLUSION

The Ethics of Responsibility and the social contract's principle of justice may be used to supplement the Ethics of Ubuntu (or vice versa) for hESC research and therapy's laws, regulations and professional guidelines in South Africa, Africa. Ubuntu is not just an ethical moral principle to Africans, but a way of life and something that every African attains, and its values get embedded into a person as they grow up into their communities and society. The values of Ubuntu which make one *umuntu* are the same values which may be fostered when writing policies and laws, regulations and professional guidelines to ensure that the legal regime is morally acceptable to South African society. These values, just to recap as I have already mentioned them in chapter 4 include humanity, respect for others, dignity, reciprocity, solidarity, caring, empathy and harmony – to mention only a few, and may be implemented within hESC research and therapy's policies, laws, regulations and professional guidelines in my own opinion. These values need not only to be expressed within the legal regime, but must be exhibited by individuals in following those laws and demonstrating these ethical principles. I therefore submit that Ubuntu as a moral principle may be used together with the Ethics of Responsibility and the principle of justice when it comes to hESC research

and therapy's legal regime so that there are no violations of human rights or moral offenses to the public.

In South Africa these values first begin with the individual and then extend to family then to the community and then to the world. This is better said by Tangwa (2000, p. 40) when he says, "based on African perceptions, the morality of an action [as in the case with Ethics of Responsibility] or procedure [as in the case of social contract] is to be determined from the standpoint of the agent rather than the patient or participants or donors of his/ her actions (or lack thereof) towards a person, a nonhuman, a plant or even an inanimate thing". For example, within African cultures when a person wants to take a plant and use it for medicinal purposes that same person must make sure that they preserve that same plant, by planting a small piece, so that the plant can grow back. By doing so, it was understood that one was preserving that plant for the present as well as for future generations and this was applying the principle of responsibility. This principle extended towards everything, whether it be plants, animals or humans (of course one cannot plant an animal or human back, it is the action and the principle of being responsible and ensuring that continuity is maintained that I am talking about). But importantly this is done because we have a responsibility towards one another as well as toward future generations (with inclusion to past generations), the environment and ecosystem. The Ethics of Responsibility require that an agent act in a manner that displays certain moral values in order for that agent to use his/ her powers responsibly regarding that technology. Values that will enable the moral agent to feel and take responsibility for their actions no matter what consequences may be. Since, Ubuntu is a community based principle the moral agent (*umuntu onobuntu*) will always act in a responsible manner towards his/ her community. We have many of examples of this happening, where Africans will come out of their communities (rural areas) and find

prosperity in the city and then go back to their 'original' community and help out, whether it be by providing job opportunities, school funding for disadvantaged children or building educational facilities or centres. They go back because they feel responsible, to upgrade and uplift their own communities or where they come from. And not necessarily their immediate families only, but the community and community members. Look also at the famous actress, Charlize Theron, born in the SA and now resides in the United States of America who demostrates Ubuntu and feeling of responsibility towards her community has created Charlize Theron African Outreach Project and became the UN Messenger of Peace, in the effort to support African youth in the fight against HIV/AIDS.

When you feel responsible for others, the community and society (national and international) you are able to take responsibility for your own decisions and actions and how they affect and influence others, as already explained by Hans Jonas' Ethics of Responsibility. For the Ethics of Responsibility to work and be effective, it requires not only that the legal system promotes it by embedding ethical responsibility, but that the moral agent feels responsible for his/ her decisions and be able to take whatever consequences may come with those decisions, whether good or bad, as long as there is a morally justifiable reason for their actions. Ubuntu as a moral principle requires that the moral agent act responsibly or feel responsible for others. That is why South African laws, regulations and professional guidelines should have these values incorporated within them for hESC research and therapy so that researchers, investors, companies and the Government always act and feel responsible towards donors, participants and the public. In my opinion it does not seem like there is a feeling of responsibility on the Government's part towards the South Africa's public healthcare sector. Otherwise this legislation would by now be in a better position to facilitate growth, and be more clear and coherent regarding hESC research and therapies. However, this decision may by then be

detrimental for South Africa as we may once again find ourselves left behind in science and technological advancement concerning hESC technology and having to depend on other nations and their research, which would not necessarily be for South Africans and ultimately Africans. Of course the regulatory system can be amended in the future, as soon as there is evidence of the benefits from this technology and as it begins to show promise internationally. However, this should not be the case and South Africa's legal framework should reflect a feeling of responsibility from its Republic towards its public (both for private and public healthcare sector) as well as the socio-cultural values of their society and communities within this legal regime.

Values are defined within communities. The values of Ubuntu which in my submission may also be viable in John Moore's social contract principle, ensure justice as fairness within South Africa. However, justice as fairness may need to be incorporated as harmony, i.e. the principle of harmony, which includes reciprocity of care as well as justice. Harmony within African cultures is regarded as a greater good, but it is challenging to explicitly define and explain. Harmony can be understood as agreeing to agree (unified agreement or agreeing together) over a particular matter in order to grow it and groom its development while everyone involved takes their responsible roles. This is necessary to creating peace, care, responsibility and ensuring justice as fairness as well as unity, solidarity and harmony by working together coherently with one accord. For this principle to be viable, the community has to agree and live in a friendly, caring and united environment. Justice is based on democracy and majority rule whereas, harmony is based on everyone agreeing on those particular laws, regulations and professional guidelines (agreeing on decisions collectively and not based a majority's agreeing- which is based on numbers or statistics). Let me elaborate this further, for example in African society people will talk or argue about a

particular issue at hand and stay for hours and even days and they never stop arguing (or debating) until everyone understands each other and everyone agrees on that particular decision. One will have to be convinced that the other's decision is not just his/ her good but for theirs too, as well as for the community.

Once this happens then both parties will agree on one decision which will be implemented as collectively with responsibility being shared together, including the consequences thereof. There is no agreeing to disagree, because that does not promote harmony as some would still be unhappy. That concept simply means we are not agreeing but just giving in to what we do not want because you have more authority or power for instance. Ubuntu promotes happiness for all and therefore it is important that everyone somehow agrees by making them understand and see another person's point of view or decision as being the best one for the community or society. This is very foreign within a democratic society where everything is based on majority's decision and majority rule. This is not how things are within African society, or how harmony works, and because justice is based on majority rule and not on making everyone agree on a particular matter, the principle of justice may not always work well, especially with regards to hESC research and therapy in South Africa. Africans have to agree and be united with their decision so that everyone (small or big, poor or opulent) is able to share in the responsibility of that decision. In this manner, the principle of harmony promotes happiness, peace, interconnectedness, unity, collectively, caring, reciprocity, solidarity, friendliness, well-being, responsibility and importantly justice as fairness.

In order for the South African legal framework to promote and maintain justice, I submit that they do so through the principle of harmony and allow society to be involved in decision

making relating to hESC technology, especially so with the benefits from this research. Currently, hESC laws, regulations and professional guidelines have many loopholes and this technology is not well regulated by the Republic. This does not seem to promote friendliness, caring, or responsibility and eventually will lead to injustice. Such a legal framework will only bring stagnation into hESC research and therapy and is not growth- oriented and flexible, thus it is unethical, in my own opinion. In conclusion, I have shown that Ubuntu as a moral principle can be used together with the Ethics of Responsibility and the principle of Justice as Fairness to implement laws, regulations and professional guidelines that are responsible. The values depicted within Ubuntu will be advantageous for hESC research and therapy in South Africa, extending to the entire African continent, and these should be incorporated within hESC technology's legal regime. These values will ensure that the legal framework has been implemented in a manner that is sensitive to local context but also applicable globally- by using Ethics of Responsibility as well as the social contract principle of Justice as fairness. In the next chapter I will propose an ethical framework policy that will have values of Ubuntu incorporated with the principle of justice and Ethics of Responsibility in order to regulate hESC technology in South Africa.

CHAPTER 7: PROPOSED ETHICAL POLICY FRAMEWORK FOR HUMAN EMBRYONIC STEM CELL IN SOUTH AFRICA

7.1 INTRODUCTION

Within South African democratic society there are diverse cultures. Therefore, this multi-cultural society often has differing points of view and outlooks based on the various cultural and religious beliefs that exist. This makes it very challenging to draw up public policies which accommodate and respect all these differences within a democratic society. It is imperative that policies within a society be grounded in ethical principles that will work best for that particular society. Moreover, it is important that these policies promote and facilitate an environment that will foster respect, dignity and appreciation of the country's socio-cultural differences within a democratic society. "The challenge for a good public policy in a tolerant democracy is to endorse a society where citizens can make educated and conscientious choices" (Nortjè 2007, p. 182). This is especially required regarding hESC technology where the public must be educated about this technology and be able to make an informed decision.

With that said, now the "governance is faced with a new challenge in this newly developing setting of 'blurred boundaries' between science and politics and between nature and society the approaches to risk control and risk management are effected" as Gottweis (2008, p. 267) mentions. The same author further states that "in the face of such uncertainty and often crises,

public participation has increasingly become a preferred strategy for policy makers wanting to build public support for a new policy or regulatory measure". This type of governance and public participation may be a preferred strategy in policy making for biotechnology innovations (specifically hESC research) in order to reduce society's fears concerning hESC technology, tackle the cultural challenges and boundaries and lastly be able to draw up a public policy that will endorse and foster respect, dignity and appreciation of its citizens within a multi-cultural society. I submit that these three ethical principles that I have chosen for this thesis will be appropriate choices in order to foster and create such a policy.

Ubuntu will facilitate an openness between all the parties and stakeholders of a society and Government involved in which the citizens will be able to raise their concerns, and these can be discussed in an open forum of some sort. These issues and concerns can then be properly explained to the public and the public can feel like their opinions have been taken into consideration before any major decision are made by the Government, and importantly, that they too were part of that decision making strategy. Governance based on Ubuntu or in an Ubuntu manner requires that decisions be taken and discussed between the Government and its society, with public participating in decision making or involvement being very important. This eliminates unnecessary commotion in the future and promotes friendliness, solidarity, harmony, care, unity and so forth, all the values of Ubuntu which Africans (Southern African) live by. This will then foster responsibility in the public as they would have made the decision based on mutual understanding with the Government and thus fostering the Ethics of Responsibility as everyone within the society and Government will then be collectively responsible for that decision and will take that responsibility together. Additionally, this way of governance will further promote and foster justice as fairness in the form of harmony within its society, thus harmony/ justice can then be implanted within

public policies as the policy makers through this public participation process will be aware of what benefits emanating from this technology are important to its society and public healthcare.

In this chapter I attempt to propose an ethical policy framework for hESC research and therapy in South Africa (with the hope that this ethical policy framework may work for South African society without overlooking all the diversity of cultures and religious beliefs). Within this chapter I will also mention some of the policies regarding hESC that have been proposed or drafted by international bodies and which may be implemented and incorporated within hESC research and therapy policy framework.

7.2 SCIENCE, ETHICS, POLITICS AND POLICY

"Before focusing on the interplay of science and politics in stem cell debate, it is useful to step back and consider how they are related in general" (The New Atlantis 2012, p. 13). The New Atlantis further mentions that there are two ways in which science and politics relate to one another and that these are similar to those mentioned by Childress in his study (despite the fact that he mentions them in terms of science and public policies). These two ways include: "First, that public policy involves decision about the use of governmental funds. Government funds, regulate, organize, direct, endorse and prohibit different aspects of scientific enterprise. Secondly, science provides policy makers with the information and advice regarding natural phenomena, technology and other matters relevant to public policy".

Relevant matters such as, "to permit, regulate or prohibit some activity such as human cloning" (The New Atlantis 2012, p. 13). Within the first 'policy way' (public policy on decision about governmental funds) it is important that governmental funding is distributed to hESC technology in the same way as any other scientific research. If it is not distributed in a fair manner, it may limit research studies in this field and those that may focus on South Africa's public health issues. Government funding in hESC technology plays a vital role in that it is required to show how the government supports and regulates this ethically contentious but yet medically promising technology. The second 'policy way' provides policy makers with the necessary information required in order to permit or prohibit the level at which governmental funding will be used for this technology in particular and most importantly its moral reasoning, "but not for political authority or regulations" (The New Atlantis 2012, p. 13). According to The New Atlantis (2012, p. 13), "science policy as a way of government support or limit science".

Therefore, within this science policy there is a clear need for an ethical framework that will address and deal with ethical issues and matters pertaining to science. Thus, making provision for an ethical analysis and assessment of such technologies as hESC in a clear and fair manner. This framework, which should be embedded within the public policy for hESC, may include within it the ethical principles of the Belmont Report (Childress 2003, p. 100); Nuremberg Code, Declaration of Helsinki and those that I mention elsewhere in this thesis. Therefore, the Ethics of Ubuntu, Ethics of Responsibility and Justice (as Harmony) should be embedded within the public policy for hESC research and therapy in South Africa to facilitate an ethical policy framework. Of course within this policy, the ethical principles of voluntary informed consent, privacy, confidentiality, beneficence, and justice (although I explain justice as harmony, since when harmony is releazed justice will be maintained) will be part of the

framework as these are already mentioned within the South African laws, Regulations and Professional Guidelines. These are important especially when it comes to gamete donors, participants in clinical trials and for patients. However, due to the current inadequacies of the law, regulations and professional guideline (specifically for hESC research and therapies including hESC patents), I will propose an ethical framework in the next section which will embed the three ethical principles that I have used in this thesis. Before that I want to have a look and describe the types of policies that hESC research and therapy may fall under as mentioned by Nortjè (2007, p. 185) in his work. Since he (Nortjè) had to evaluate and determine where hESC research and therapies can be regulated under which policies and legal framework. He mentions three different types of policies which include:

i. Option One: Governmental guideline (possibly by a body), with no legal ban- This approach support the notion of flexibility. The regulatory body would offer guidelines to help those involved in the field of study, and would also decide if certain stem cell research techniques are adequately safe to merit attempts. This agency would furthermore act as licensing authority establishing clear-cut guidelines outlining acceptable and unacceptable applications of any techniques.

ii. Option Two: Self-regulation by professionals, with no legislative action – This option will allow researchers to choose individually whether to engage in stem cell research and would carry no legislative restraint. The researcher's discretion on self-regulation, as an expert in the field, would guide his or her actions. These experts would establish within their own community their own system for self-regulation to prevent abuse of the technology.

iii. Option Three: A temporary ban on stem cell research – This approach would prohibit stem cell research for any reason, enacted in a ban. However, it would also facilitate public debate and impose an obligatory re-examination of the ban after a specific period of time. (Nortjè 2007, p. 185).

Thus, within those above mentioned types of policy careful assessment, analysis and discussion of the advantages and disadvantages is then required in order to choose a policy option that will work for that country's society and for that technology within that society as well.

7.3 PROPOSED ETHICAL POLICY FRAMEWORK

Currently, the South African laws, regulations and professional guidelines that regulate hESC research and therapy in the country have some lacunae concerning this technology. There is a need for a clear and robust hESC research and therapy regulation in the country and the legal framework. The legal regime should not do this by default, but regulation should always be intentional. Intentionally regulating this technology whether by permitting or prohibiting it is required, and this will clarify the position of hESC research and therapy within the country. With that said, I will attempt to formulate such an ethical policy framework for hESC research and therapy in South Africa. My proposed framework also takes into account my argument on the moral status of the embryo, namely, that an embryo does not possess any moral standing, thus harvesting and culturing of the human embryo as a source for hESC research and therapy will not be a violation of any kind (morally and legally).

I want to make it clear first that I am in support of and propose a policy framework that will promote and endorse voluntary informed consent, privacy, confidentiality, beneficence and harmony (rather than justice). Thus, respect for autonomy should be in the context of Ubuntu,

where necessary collective autonomy, both the 'parents' of the embryo be considered. That is, benefit from this research and any derived therapies should benefit society and be distributed towards society in an equitable manner that will promote respect, dignity, unity, care, good health, quality of life and solidarity towards South African society, especially in public healthcare. Such values of Ubuntu should be fostered and maintained even if the goals of the hESC research studies are purely for scientific research purposes (such as obtaining basic scientific knowledge) only, and of course first consideration would be for studies that are for therapeutic purposes. However, before we can get into therapeutic studies there is still a need for pure basic research work in this field and thus a need for a consensus agreement in general regarding a way forward in terms of policies and legislation in the country. This will enable this field to start growing and developing. However, due to the moral debates and lacunae within the legal and regulatory regime, a clear and stable policy framework is required in order to facilitate growth and development in hESC research and therapy. The recommended policy framework I am submitting may be classified as something between Nortjè's policy option 1 and option 2. Therefore, with that said I would like to propose the following:

i. Sources of human embryonic stem cells

South African regulations allow for the use and harvesting of 14 day old left-over IVF embryos, aborted foetuses or cadaveric foetal tissue, the creation of embryo through IVF as well as SCNT and hESC lines for hESC research and therapy. Although the law is not explicitly clear concerning the sources that can be used, it seems to be interpreted to allow the above sources to be used. Also included is the application and harvesting of 'fresh-embryos' for either or both research and therapy as may be interpreted from the NHA to be legally

permitted for hESC. For this reason, I submit that these source be explicitly included within the regulations, some with certain restrictions, for example 'fresh-embryos' which may be required for genetic analysis, advancement of therapies or for research purpose especially with certain disorders and defects which may only affect a minority few. Additionally, these may be linked to family disorders that can easily be used in IVF research and statistical analysis in order to improve certain processes or procedures, and as well as in future studies for couples undergoing IVF procedures. Therefore, the regulations need to be drafted in order to include all the sources of hESC as well as their restriction with some of the sources.

Other procedures or techniques that may be used such as Altered Nuclear Transfer (ANT), Pre-implantation Genetic Diagnosis (PGD), "organically dead embryos", and embryonic stem cell fusion still have their own scientific challenges together with ethical concerns. Therefore, I propose that these techniques should only be used under specific circumstances, but at the moment they may be used experimentally to verify how well they can be applied. Thus, an ethics committee will have to analyse and scrutinize and make a discretional and moral judgment in such circumstances before permitting the use of such techniques. These techniques may in time show scientific validation and efficacy, but for now they need to only be applied if all other methods have failed and if one of these techniques is proven to be the best option for the improvement of these therapies.

ii. Laws, regulations and professional guidelines for hESC research and therapy

In the context of hESC research, a section for all the prohibited processes or techniques would have been better, with human reproductive cloning included under it. Whereas, section 57(2) to 57 (6) of the NHA should have been under a new title for hESC research. Therefore it may be suitable to have a regulation that only deals and adress hESC research and therapy to address the vacuum found within the legislation. The NHA also provides that the Minister appoints a National Research Ethics Committee (NREC), however there should be an extension to this committee or an independent hESC-REC (or one for Stem Cell based research and therapy) since many may not have all the necessary skills to evaluate stem cell research (including the local REC even if there are special requirements by the REC to have such research studies and therapies reviewed by competent individual this may not be enough in this context). hESC research and therapy needs qualified individuals with expertise who will sit on the REC and be able to understand the dynamics of stem cell research, projects, clinical trials and therapeutic purposes to be evaluated appropriately and ensure that there would be no violations of the participant's, donor's or patient's rights and that the research is ethically conducted amongst other measures. Therefore, South Africa needs to have an appropriate hESC-REC for all the hESC research and therapeutic work, individuals who are qualified and are experts in this field and in different disciplines, who will be responsible for addressing and dealing with ethical and socio-cultural matters. When a Stem Cell Ethics Committee (SCREC) is established then they will be responsible for hESC research and therapeutic ethical decisions which the REC may then approve the research. I propose that an independent hESC-REC (or Stem Cell REC) be established and implemented within the system. This will consist of relevant and competent individuals with different academic or

disciplinary backgrounds and they can better handle these issues (legally and ethically) relating to hESC research and therapy and can therefore report to the NREC as required.

The Guidelines on Ethics for Medical Research Reproductive Biology and Genetic Research have a set of conditions that may be applied for therapeutic cloning. I propose that the same conditions be applied and enforced with regards to hESC therapy or medicinal products or devices and that a NREC and REC must approve first of those therapies/ product or devices to be used for therapeutic application in order to ensure safety of the patient(s). These conditions I have already mention in Chapter 5 (section 5.6.2 page 140) under the heading "Guidelines". Pricing for therapies or medicinal products or devices affect issues relating to social justice and these will have to be analysed by both the NREC and REC. Therefore, I propose that within the pricing committee they also include a bioethicist as a member who will be aware of the implications that medical devices and therapy prices will have on social justice and harmony. There newly implemented Medicine and Related Substance Act 1965 (No. 101 of 1965 amended in 2008) Regulation regarding Medical Devices and IVFs, will reduce the vacuum within the biotechnology therapy and biological products and devices legislation. This will help analyse how hESC therapies or medicinal product or devices will be regulated and this is crucial as it may have some effect on justice (distributive justice). This is imperative with biotechnology medicine and medical devices, more so those from hESC based therapy, which are already surrounded by moral and ethical issues, from the harvesting and destruction of the embryo to patenting and commercialisation of these hESC therapies. With that said, I cannot propose much in terms of hESC therapies except that a Bioethicist be included within the pricing committee who will be able to evaluate if prices will bring about social justice and harmony or not, since these therapies and medical device prices may be 'high' and unaffordable to those from poor and disadvantaged background.

iii. hESC Patents and Justice

Before I make any proposal with regards to hESC patents there should be clarity that legally speaking (based on the standard criteria for patents) hESC inventions are patentable subject matter. Therefore, hESC patents are legally based on the South African Patent Act of 1978 (No. 57) unless proven to be against *ordre public* and morality. With that said, my proposition is that a hESC Ethical Review Patent Examination Board should be embedded into the system. This board will work hand in hand with the Patent Examination Board, Patent Officers or Court. This same board I mentioned earlier, hESC-REC, will then be responsible for ethical issues regarding hESC patents. Therefore, it will have certain duties such as: examining the *ordre public* and morality clause regarding hESC inventions and patents; development of ethical guidelines and procedures for hESC inventions and patents; and development of patent policies regarding hESC technology; enforcement of ethical measures with hESC patent applicants. This Board should consist of specialised and skilled individuals in the field of science, who will be able to assist and review the "non-obvious or inventive step" as well as the "industrial applicability" criteria requirements relating to hESC patents.

I further propose that ethical rules or guidelines be drafted which will assist with testing or assessing hESC patents in terms of what may be offensive to *ordre public* and morality by these inventions or 'working' of hESC patents. Therefore, appropriate definitions for certain terms needs to be incorporated, used and adopted within the Act and regulations and guidelines. These definitions must also be clearly defined to assist applications as well as

assessments of specific types of activities that will be considered as contrary to *ordre public* and morality, thereby being excluded from being patentable subject matter.

Concerning issue relating to the morality of hESC patents such as justice, there have been suggestions that the benefits from such patents should be shared with society but not excluding the patent holder(s). Therefore, submission of a MTA[15] and Benefit Sharing Agreement (BSA) for hESC patents during applications or during licensing agreements will be required for these documents to be assessed by the hESC-REC. The BSA document, together with the licensing agreement, should stipulate clearly how benefits will be shared between the licensee and licensor as well as society, and this should include both monitory and non-monitory benefits when it comes to social responsibility and benefit-sharing. Even for inventions that may not be for commercial purposes, there is still a need for a BSA document that will stipulate what benefit there is how and it will be shared. An example of a BSA document can be seen within South Africa's "Bioprospecting Access and Benefit-sharing Regulatory Framework: Guideline for Providers, Users and Regulators" (2012). Ultimately policy makers and legislators can use some international documents such as those created by HUGO or WHO or WIPO. I propose that such documents be drafted and upon approval embedded as part of the hESC patent system. It will be necessary and important to have such a document for hESC technology to eliminate any unethical conduct, actions as well as injustice which may cause disharmony in the future.

[15] An example of an generic MTA that may be adopted within the patent system for hESC licensing agreement is from the University of Witwatersrand, Material Transfer Agreement for Human Biological Materials (https://www.witshealth.co.za/Portals/0/MTA_-_WITS_Material_Transfer_Agreement_-_Version_1_January_2018.docx).

I recommend that the above mentioned national and international policy documents on benefit-sharing be used to draft a benefit-sharing document to be implemented for hESC patent regimes for both allocative and distributive benefits. Some of the benefit-sharing methods that I would like to put forward are those mentioned by Schrecker (2013, p. 2) who divided these benefits into three levels: "(i) level one involves the claims of individuals whose tissue have been used in research that leads to commercial products, (ii) level two involves the claims of populations that have contributed to research that yields commercialisable results, whether by providing actual biological materials or by making possible the details documentation of pedigree, and (iii) level three involves allocation of these benefits from research and its commercial products, independently from considerations of individual or group contributions to research across national borders and boundaries of other kinds that are defined by race, gender and especially social and economic situations". Additionally, the HUGO Ethics Committee presented six benefit-sharing recommendations which can be adopted in various biotechnology research. These include: "(i) that all humanity share in and have access to the benefits of genetic research, (ii) that benefits must not be limited to those individuals who participated in such research, (iii) that these be prior discussed with groups or communities on issues regarding benefit-sharing, (iv) that even in the absence of profits, immediate health benefits as determined by community needs could be provided, (v) that as a minimum, all research participants should receive information about general research outcomes and an indication of appreciation, (vi) that profit-making entities dedicate a percentage (example of 1% - 3%) of their annual net profit to healthcare infrastructure and/ or to humanitarian efforts*"*. The Declaration of UNESCO on Bioethics and Human Rights Article 15 of 2005 listed the following in order to address benefit-sharing; "(i) benefits resulting from any scientific research and its application should be shared with society as a whole and within the international community in particular with developing

countries and (ii) that research should be responsive to the needs of the host countries and alleviation of serious and 'important' health issues". These benefit-sharing recommendations may be adopted and applied to hESC research and patents, and dictate how benefits from this research and patents exploitation can be distributed among the public. Of course, the State will have to identify the most convenient benefit-sharing policies for hESC research and therapy which will be applicable to them on a more socio-cultural and morally acceptable level. In addition, the State will also need to also address the differences in this benefit-sharing for local biotechnology companies or research funded by local funders versus those funded by international funders or companies. Additionally, whether or not a participant should receive benefits based on their contribution to research is a matter that needs to be debated and addressed further. Thus, these above benefit-sharing policies may be used to draft a more appropriate BSA policy for hESC research, therapy and 'exploitation' of hESC patents for South Africa, that will then form part of the legal and regulatory system for hESC research and therapy. However, I do want to stress that both monetary and non-monetary benefits should be included in such a document, irrespective of whether or not the researchers or funders are locally based or internationally based.

7.4 RECOMMENDATIONS

I submit that South Africa establishes a separate regulation for hESC research and therapy which will deal with and address all the issues that are related to hESC technology (research, therapies and patents) and will supersede the other legislations, and where necessary be

supplemented by the other Acts (NHA, S.A patent Act and Medicinal and Related Substance Act). This may be called the 'South African Human Embryonic Stem Cell Act' and will include all the necessary definitions, issues of informed consent particularly for hESC, gamete donation (including those from aborted foetus), safety in facilities that conduct research and therapeutic work on hESC, personnel requirements (such as qualifications and registration with HPCSA), enforcement of all the activities that are permitted and prohibited for research and therapy with inclusion to different techniques that may be used. Additionally this Act may enforce the establishment and activities of the hESC-REC that will report to the Minister. This hESC-REC may be used as a central ethics committee for research, patenting and therapies, *but not for the pricing of hESC therapies*. The pricing committee for therapies will require a separate Bioethicist who will focus on pricing matters regarding hESC therapies. Moreover, the South African patent system should move away from being a Registration system and implement an Examination System, with the Examination Board developing guidelines for assessing the patent criteria. This of course has to do with the patent criteria concerning and relating to; novelty, non-obviousness, industrial applicability as well as disclosure, and not the morality clause which will have to be addressed by the hESC-REC. Equally important are issues of licensing agreement and fees regarding hESC patents. Therefore, development of a generic licensing agreement for hESC inventions and patents will assist in mitigating such issues that may result from these patents. This will assist in the developing of legal regime that will not only be ethical but will be founded on the Ethics of Responsibility, Justice as fairness as well on Ubuntu. There is still much that is needed to be implemented in terms of hESC patents as well as pricing of therapies from this technology.

7.5 CONCLUSION

South Africa still has a long way to go before hESC research and therapy is regulated in order to facilitate an environment that will provide growth and development. However, there have been some improvements and with the development of policies such an environment will be possible with time. My proposed policy is not to serve as the definitive solution, but hopefully the beginning of a framework for hESC research and therapy in South Africa that is ethical and legal and which will facilitate an infrastructure for growth and development if implemented appropriately. We need to establish much more liberal policies for this technology, which are growth-oriented as well as flexible, current, socio-culturally appropriate and global. This will help us be at the forefront in research work regarding hESC technology, and South Africa has no morally justifiable reason as to why it cannot allow hESC research and therapies, based on the principles of Ubuntu. South Africa is therefore at a better position to excel in this field and be one of the countries at the forefront. Because South Africa is currently operating under a self-regulation policy regarding hESC, there is a need for legal and regulatory enforcement as we cannot be self-regulating when it comes to such contentious scientific fields that may affect public's healthcare in the future. A change in the hESC policy, laws, regulations and professional guidelines is required and soon. However, as I have proposed the legal framework for hESC should be founded upon the three ethical principles I have mentioned: Ethics of Ubuntu, Ethics of Responsibility and Justice as fairness, i.e. Principle of Harmony.

CHAPTER 8: OVERALL CONCLUSION

Harvesting and using human embryos for research and therapeutic purpose has led to many ethical controversies and issues which have not been fully resolved. Research progress in this field is still slow. This is a concern, seeing that the ethical issues have been debated now for more than a decade, yet remain unresolved. This technology offers promising potential future benefits, not only with regards to the alleviation of human suffering by means of possible therapies and devices, but also through the advancement of scientific knowledge that may result from this technology. One of the main reasons for slowing of the progress, growth and development of hESC research and therapy has to do with laws and regulations that govern the instrumentalisation of the human embryo for this research and therapy, including professional guidelines. Thus, the legal framework that governs and regulates the use of the human embryo for hESC research and therapy must not only be legally sound and ensure that human rights are not violated, it must also be demonstrably ethically sound and justifiable. Therefore, the ethical issues and concerns regarding the moral status of the human embryo are of concern and need to be dealt with and debated in detail. It is important that a resolution regarding the moral status of the human embryo be found, in order for ethical policies and legislation to be implemented that will then facilitate an environment that will ensure growth and development, not only nationally, but globally too. So it is imperative that policies be drafted which are not only flexible but are also drafted in such a manner that they promote a balance between the different ethical points of view – by making use of or applying different ethical principles and views from different socio-cultural positions- this will ensure that the legislation and regulations that will be implemented are legally and ethically sound. This is particularly important for hESC research and therapy because of the controversies that it has been surrounded by ever since its first ‘discovery’.

One of the main ethical issues concerning the use and harvesting of the human embryo for hESC research and therapy is centred on the destruction of the embryo, i.e. the moral status of the embryo. Those who argue against the use of the human embryo for hESC research and therapy equate harvesting of the human embryo to killing a potential human being. In Chapter 2 I addressed debates on the moral status of the human embryo from both the Western and African perspective and whether or not a human embryo possesses the same moral status as with a 'fully' developed human being. I described in detail the different ethical arguments used within these debates regarding the harvesting of the human embryo for hESC research and therapy. These arguments included ethical principles from Kantian's point of view and a Utilitarian point of view in order to determine the moral status of the human embryo, as well as arguments on the potentiality of the human embryo. Whereas from the African perspective the argument was based on Ethics of Ubuntu. The arguments from a Western point of view show that the human embryo does not possess a moral status akin to a 'fully' develop human being. Therefore, harvesting of the human embryo for hESC research and therapy will not be violating the embryo's rights, nor is it unethical.

The same was also seen with regards to the moral status of the human embryo from an African perspective in Chapter 2. Based on Ubuntu, an embryo does not possess the same moral status as a 'fully' developed human being. For an individual to be regarded as a person within Ubuntu (a person with personhood, *umuntu onobuntu*), they will first need to be born and then gradually grow and have a relationship with their community. Personhood, from an African perspective is understood in terms of that individual's interrelationship with his or her community and it is developmental as they grow (meaning as a a person grows and interconnects with his or her community). Hence, an embryo at the stage (14 days) that it used for hESC research and therapy has not yet developed enough to possess Ubuntu and

therefore does not possess the same moral status as a 'fully' developed human being. Both the Western and African notions regarding the moral status of the human embryo seem to agree and indicate that the human embryo does not possess the same moral status as with the 'fully' developed human being, and therefore human embryo may be instrumentalised for hESC research and therapy. What is interesting to note is that even though both Western and African notions do not consider the human embryo as possessing the same moral status as a 'fully' develop human being many still oppose harvesting of the human embryo for hESC research and therapy and are in favour of the other alternative stem cell technologies, which include ASC and hiPSC, with hiPSC being the preferred alternative to hESC.

As a results of such perspectives there was a need for a separate chapter which would deal with and compare these other alternative stem cell technologies with hESC technology. Thus, Chapter 3 specifically deals, in detail, with these alternative stem cell technologies in comparison to hESC. Comparisons were made based on the technical, manufacturing, clinical as well as ethical issues and concerns. This was imperative as there are claims that these alternative stem cell technologies give rise to no or little ethical issues. However in Chapter 3 I show that this is untrue. Ethical issues and concerns which are very similar to those related to hESC technologies (maybe not be so from the point of the moral status) do arise. Issues of IPR (in a form of patents) are much more relevant and may have more detrimental effects than those from hESC technologies. In addition to these ethical issues are issues of accessibility and the affordability of these alternative stem cell compared to hESC as their technical and manufacturing procedures may be more expensive than those of hESC. This makes their therapies and medical device expensive and only affordable to opulent individuals and/ or countries. Apart from these ethical issues, these alternative still require a lot of work (technically, manufacturing and clinically). Therefore, eliminating hESC may not

be a solution at this point in time as the hESC may still be required as a standard. Moreover, hESC is the only stem cell that has not been modified (compared to hiPSC) and this technology may also be important in developing other medical devices, treatment or therapies. Therefore, favouring of these alternative is unwarranted in the absence of enough information as to how much 'better' they really are in comparison to hESC research and therapy. Thus, laws and regulations and even professional guidelines should not be drafted in such a manner as to promote these alternative based on the notion that they give rise to 'lesser' or no ethical issues as compared to hESC.

In chapter 4, I discussed the morality of hESC patents, an issues that need equal attention as with the moral status of the human embryo for research and therapy. I argued that based on the Western notion, there are morality issues that pertain to hESC patents. These issues may include but are not limited to notions of ownership right and further elaborated on how this issue can cause hESC patents to appear as immoral. This is often perceived as placing a price on the life (human embryo) through commercialisation. I later in the Chapter discuss the same issues from an African perspective. hESC patents may not be regarded as ethically acceptable unless benefits from these patents are shared with the community and that these patents promote and maintains the virtues and values of Ubuntu, such as solidarity, harmony, unity, caring and so forth. On that foundation, my study entailed the normative analysis of the South African laws, regulations and professional guidelines regarding hESC research and therapy. Thus, in Chapter 5 I then analyse the SA law, regulations and professional guidelines regarding hESC research and therapy. This indicated that the SA's legal framework still has many holes concerning hESC research and therapy and it is also drafted to have a broad interpretation. This however should not be the case especially when it comes to issues that related to stem cells such as hESC research and therapy. The legal framework needs to be

more direct (by this I mean intentional), yet flexible and growth oriented. South African law permits the use of hESC lines, left-over IVF embryos, embryos created by IVF as well through SCNT for research and therapeutic purpose. Although, this is not explicitly clear (speaking as a scientist) it can be interpreted that 'fresh embryos' can also be used as long as they are not above 14 days of age. But, 'fresh embryo' are not specifically reported to have been included as part of the sources that may be harvested for hESC research and therapy and thus have by default been prohibited. Additionally, the same legislation is much more explicit when it comes to alternative stem cells which only makes one wonder if these are not being favoured above hESC. Thus, South African legislation seems to favour (by default) these other alternative stem cell sources without any moral and ethical justification. Moreover, the professional guidelines suggest that hESC patents be prohibited, which makes SA appear unfriendly towards hESC research and therapy. The laws, regulations and professional guidelines need to be writen in such a manner that clarity concerning hESC research and therapy and patents needs to be obtained. Because there is no need for the prohibition of hESC in South Africa and Africa as a whole, these regulations need to be amended and better hESC policies drafted that will facilitate flexibility and promotion of growth, development and progress, with a balance regarding the ethical issues from hESC research and therapy. Furthermore, the legal regime must be intentional in what it allows and prohibits, or allows with restrictions. Otherwise, such laws, regulations and professional guidelines will only slow down growth and development of hESC research and therapy. Furthermore, this will not create an environment where research is done for South Africans, in South Africa, that will deal with South African society's medical and health issues and concerns as a whole. So there is a need for policies that are more flexible and will be able to cater for and create such an environment for hESC research and therapy, thus fostering a legal framework that will facility an environment for growth and development for hESC research and therapy.

For this reason I chose to use the three ethical principles to discuss normatively the SA legal framework for hESC research and therapy in Chapter 6 . These ethical principles that were used include Ubuntu (since I am dealing with South African laws and Africa), the Ethics of Responsibility (as it deals with and addresses issues that pertain to new technology such as those of Biotechnology) and the Social Contract theory (based on Justice as fairness, but I extended this to include Justice as Harmony). If the legal framework for hESC research and therapy can incorporate these principle in order to govern hESC research and therapy in South Africa this will not only ensure ethical laws, regulations and professional guidelines but also ones that will be suited for South Africans in South Africa (Africans in Africa). Laws, regulations and professional guidelines that will work for South Africans and will promote virtues and values of Ubuntu while maintaining ethical responsibility and promoting justice as fairness for all its citizens despite their background. Moreover, these will in turn also facilitating an environment for growth and development within hESC research and application of the sources for harvesting human embryos, in maintaining human life, dignity and respect.

In Chapter 7 I attempt to develop a proposed ethical policy framework for hESC research and therapy in South Africa, with the inclusion of patent laws that I submit will be ethically sound. This policy framework is not intended to serve as the sole answer, although the policies are part of the answer, but as a means to build an infrastructure that may improve certain areas within the legal framework, in order to facilitate an environment for hESC research and therapy in South Africa and Africa as a whole. This is just to give some points and guidance as to what may be needed and how to incorporate some of the ethical principles within the hESC research and therapy legal framework. Within this proposed policy framework I seek to endorse human life, dignity and respect but also create and facilitate a

policy that will facilitate an environment that has balance (all the ethical issues and concerns) with regards to the instrumentalisation of the human embryo for hESC research and therapy by incorporating the three chosen ethical principles used in this thesis. Of course more work is still needed in order to come to a place and position in which the law, regulations and professional guidelines are now working in coherence to bring about growth and development. However, creating policies that may assist with such is of great importance, more so in underdeveloped countries where many suffer from all sorts of diseases, sickness and disorders without any hope, and where medical resource and care is limited. hESC research and therapy may help in developing therapies, treatments and medical devices that may alleviate and be used as well in public healthcare sector. However, the Government has a responsibility to ensure that such is recognised and through policies these can be made possible for their own society as a whole, and also open doors for global associations and collaboration which may benefit their society.

In conclusion, SA's legal regime has a long way to go in order to directly accommodate hESC research and therapy. However, there have been some improvements since the conception of hESC technology as noted in this research study. South Africa can become a desirable country for growth and development (scientific, business and clinical or therapuetic) of hESC research and therapies because of the socio-cultural differences, resources and technology facilities than most African countries. Moreover, SA can also be used as a hub for Africa regading hESC technologies. And for this reason, with inclusion to Ubuntu, SA should have no problems in the future to improve regulations, professional guidelines and policies regarding hESC research and therapies, in order to facilitate better growth and development and this is direction that should be taken. This study only showed that there are more ethical issues that have been explored but more work is also required to

directly address matters concerning hESC research and therapies. Moreover, the legal regime is not drafted from the African principle of Ubuntu and this should be corrected where possible as well as making the legal regime more direct, coherent and clear in regulating hESC research and therapies. Such an action will make the laws, regulations and proffesional guidelines regading hESC research and therapies ethically and morally acceptable, as it will results in harmony.

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APPENDIX

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1. Figure 2.1**:** Human embryonic stem cell (hESC) derived from the inner cell mass, harvested and cultured to produce different cell lineage;

Figure 2.2: Somatic Nuclear Transfer (SNCT) procedure – from the nucleated egg of a donor the nucleus is removed resulting in enucleated egg. A somatic material (from skin for instance) of a recipient's genetic material placed in the enucleated egg and harvested. From the Morula step the process will be the same as that of Figure 2.1; and

Figure 3.3.1: Diagram showing embryonic dependent procedure of IVF and SNCT as well as the embryo- independent procedure of reprogramming somatic cells using gene factors and retrovirus vector to culture and harvest pluripotent stem cell.

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2. Figure 3.3.2: Diagram showing the harvesting and culturing of pluripotent stem cell with (a) representing harvesting and culturing of human embryo from IVF procedure and (b)

represents the different direct methods applied to harvest and culture hiPSC with somatic cells

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