



UNIVERSITI
TEKNOLOGI
MARA

Professorial Lecture

TO CLONE
OR NOT TO CLONE...

*and other ethical issues in
pharmacy and medicine*



ABU BAKAR ABDUL MAJEED

Professorial Lecture

TO CLONE OR NOT TO CLONE...

*and other ethical issues in
pharmacy and medicine*

Professorial Lecture

TO CLONE OR NOT TO CLONE... *and other ethical issues in pharmacy and medicine*

Abu Bakar Abdul Majeed

University Publication Centre (UPENA)

Universiti Teknologi MARA • SHAH ALAM • 2009

© University Publication Centre (UPENA), UiTM 2009

All rights reserved. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or by any means – electronic, mechanical, photocopying, recording or otherwise; without prior permission in writing from the Director of University Publication Centre (UPENA), Universiti Teknologi MARA, 40450 Shah Alam, Selangor Darul Ehsan, Malaysia.
e-mail: upena@salam.uitm.edu.my

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Abu Bakar Abdul Majeed

Professorial lecture : to clone or not to clone - and other ethical
Issues In pharmacy and medicine / Abu Bakar bin Abdul Majeed.
ISBN 978-967-305-420-6

1. Pharmaceutical ethics. 2. Pharmacy--Social aspects.
3. Pharmaceutical services. 4. Pharmacy management. I. Title.
174.2

Editor : Megawati Omar
Cover design : Muhammad Bahtiar Masidin/Siti Suhaini Mazlan
Typesetting : Siti Mahteran Mohd Faudzi
Typeface : Helvetica/Times
Typesize : 11/12

Printed in Malaysia by : Univision Press Sdn. Bhd.
Lot 47 & 48, Jalan SR 1/9, Seksyen 9,
Taman Serdang Raya,
43300 Seri Kembangan, Selangor
e-mail: univisionpress@gmail.com

Contents

<i>Acknowledgements</i>	vii
Abstract	1
Introduction	2
How (Why) It All Began	4
Cloning from Adult Cells - The Scientific Breakthrough	10
Why Cloning?	15
Ethics	16
Secular Bioethics	19
Islamic Bioethics	21
Ethics of Cloning	26
Stem Cells Research	31
Death - And the Right to Die?	35

Pharmacoethics	45
Conclusion	52
<i>References and Bibliography</i>	54
<i>Index</i>	61
<i>Biodata</i>	65

Acknowledgements

Balkhis, Abdul Azeem, Aisyah, Atikah, Abdul Azeez
Vice Chancellor and Deputy Vice Chancellors, Universiti
Teknologi MARA (UiTM)

Ministry of Higher Education

Ministry of Science, Technology and Innovation

Ministry of Health

Dr Guitelle Baghdadi, World Health Organisation

Dean and Staff of Faculty of Pharmacy UiTM

Research Management Institute (RMI)

Centre for Islamic Thought and Understanding

UPENA, UiTM

Institute of Leadership and Quality Management, UiTM

Institute of Islamic Understanding Malaysia (IKIM)

Dr Kalavathy Ramasamy

Mustafar Kamal Hamzah

Dr Megawati Omar

Muhammad Bahtiar Masidin

Dr Rosa Elizabeth Valente Pereira,

University of Porto, Portugal

Ezlina Usir

Dr Nadeem Irfan Bukhari, International Medical University

Assoc. Prof. Dr Lua Pei Lin

Tommy Julianto
Richard Muhammad Johari James
Siti Hadijah Shamsuddin
Wan Sazrina Wan Zaid
Mohd Nazif Samat@Deram
Salizatul Ilyana Binti Ibrahim
Salwati Abdul Kadir Wati Rahman
Haslan Roslie
Hana Abdul Razak
Roskhatijah Radzuan
Murni Mansor
and many others...

Thank you to all for your support!

TO CLONE OR NOT TO CLONE...

and other ethical issues in pharmacy and medicine

ABSTRACT

In the last fifty years or so, advances in biotechnology, pharmacy and medicine have led to the introduction of novel and innovative products and procedures. Although these discoveries have provided benefits to patients, they have also created new ethical conundrums. Issues like human cloning, artificial reproductive technologies, genetic engineering, organ donation and transplant, stem cells research and euthanasia are becoming more pertinent and require a judicious approach to appease both practitioners and patients. The practice of pharmacy and medicine also requires a strong subscription to specific code of ethics. The discipline of bioethics, which encompasses medical ethics and pharmacoethics, has been introduced to provide an avenue for discussions on ethical practices in biotechnology, pharmacy and medicine. Bioethics can be defined as the study of the rightness and wrongness of acts performed within the discipline of life science, through the application of both ethical theory and case study method. The various moral questions pertaining to biotechnology, pharmacy and medicine in the contemporary world demand the adoption of applied ethics using ethical principles to solve real-life problems. However, simply adopting applied ethics based on secular approach may not be ideal. We must move effectively toward forging a meaningful dialogue between bioethics and religion, sometimes separated by a

vast gap of misunderstanding, and mistrust and miscommunication. Religious principles and prescriptions must be the foundation for discussing ethical issues as the reason for religion's presence rests deep in the being of a species. It is to be argued that Muslims, for example, expect ethical solutions that are based on the principles of the shariah or Islamic law. By subscribing to this approach, in Islam ethical issues like therapeutic cloning, organ donation and transplant, and artificial insemination appear to have been mostly settled.

INTRODUCTION

*To be, or not to be: that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of outrageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them? To die: to sleep.*

The Tragedy of Hamlet, Prince of Denmark, or more simply Hamlet, is a play of tragedy, deceit and greed by William Shakespeare, believed to have been written between 1599 and 1601. In it, Hamlet's indecisiveness and uncertainty of knowledge forces him to make the choice between the life of action ("to be") and life of silent acceptance ("not to be").

The issue of cloning appears to be akin to Hamlet's dilemma (en.wikipedia.org/wiki/Hamlet).

In 1997, Ian Wilmut and colleagues of Roslin Institute (Edinburgh) submitted a seemingly harmless letter to *Nature* with the title, "Viable offspring derived from fetal and adult mammalian cells." Quoting the most pertinent part of the letter thus, ".....we now report the birth of live lambs from three new cell populations established from adult mammary gland, fetus and embryo." (*Nature* Vol. 385 (February 27, 1997) p. 810-813).

The team at Roslin had a simple objective of enhancing the efficiency of producing livestock to boost agricultural productivity. However, the world immediately took notice of their breakthrough especially the successful birth of a live lamb from cells originating from the mammary gland (an adult or mature cell, i.e. cloning of adult cells). Intuitively too, it was recognised that this issue definitely had gone beyond science. In fact it was more theological in nature as it was set to challenge some of the most basic principles of religion, especially those pertaining to the concept of human creation and the ambit of a family unit.

The news on cloning of the sheep, nicknamed Dolly, (*which later developed arthritis at an abnormally young age, and died prematurely in 2003 due to a virus-induced lung disease called sheep pulmonary adenomatosis*), was treated with an almost instantaneous rebuttal from the Church of Scotland (Peters, 1997). The *TIME* magazine described the report a 'soulquake'. The poll that was conducted then, posed theological questions to readers such as: "Is it against God's will to clone human beings?" 74% answered "yes"; 19% said "no." The March 3, 1997 edition of the German newspaper *Der Spiegel* put up the picture of multiple copies of among others, Adolph Hitler and Albert Einstein along with a distinctive caption: "*Der Sundenfall*" (the fall into sin).

However, not all theologians and ethicists were outrage. Philip Hefner of the Chicago Centre for Religion and Science suggested that caution be exercised in dealing with this new scientific capability, as "we are all accountable to God in whatever that we do". The Centre for Theology and the Natural Sciences in Berkeley was open to the cloning technique by emphasising that "God could be seen as continuing to create through human agency." Nevertheless, regardless of whether in a mood of outrage or cautionary stewardship, everyone agrees that human cloning is a religious issue.

HOW (WHY) IT ALL BEGAN?

The twentieth century witnessed science's involvement with the process of human procreation at a level never seen before in the history of mankind. Scientists and doctors were very much part of the reproduction process, from advising on nutrition and child-health, to managing women's labours in increasingly technological ways, to supervising pregnancy which included a growing number of tests and medical procedures, and to controlling fertility itself. Thus the hitherto private biological process embedded within the natural powers of men and women that happens in the bedroom has become regimented medical and technological processes that take place in clinics, hospital and laboratories.

The birth of Louise Brown in Lancashire, England on July 25, 1978, was a milestone in the history of reproductive technologies. Miss Brown, fondly referred to as the first 'test-tube baby' celebrated her 31st birthday this year. She is married and has a child. Ms Brown was conceived, not inside her mother's womb, but in a petri dish. This was where the eggs from her mother were mixed with the sperm from the father for fertilization to take place. The technique is termed *in vitro* fertilization (IVF) and the product, 'test-tube baby'. IVF is a type of artificial or assisted insemination (AI) procedure. In its simplest form, AI involves collecting the semen from a man, treating the semen in the laboratory, and lastly placing the treated semen in the cervix or the womb of a woman.

IVF became well-accepted as a relatively risk-free technique and by 1990, there were more than 25,000 'test-tube babies' in the world. Today, the number of 'test-tube babies' has surpassed the 3 million mark. IVF and the other AI techniques are currently employed to assist reproduction in childless couples. These procedures have provided new hope to barren couples. The pressure is even more so in societies which consider bearing children a sign of esteem, wealth and prosperity.

However, despite the successes of IVF there remain many difficult and frustrating problems associated with the technique. Firstly, the process is rather tedious. Secondly, the rate of successful implantation of fertilised embryos is not that encouraging (about 20% for the whole population). This sometimes has a tremendous psychological impact on the patients. Thirdly, there is a risk of multiple pregnancies due to drug-induced ovulation. Fourthly, there is a danger of ectopic pregnancies, or conception outside the uterus. Thus it follows that cloning is a logical progression of artificial reproductive technology that started with *in vitro* fertilization and, is driven by a desire to relieve human suffering – in this case, the mental agony of infertile couples.

In scientific terms, cloning is a method of making copies of the long chain organic molecule, deoxyribonucleic acid (DNA). DNA encodes all the information needed to procreate a living being including human. Copying or cloning DNA would lead to the ability to replicate that being, and if the cloned DNA is a human DNA, then replicating human becomes a very distinct possibility.

Cloning *per se* is not a new idea (Table 1). As early as 1952, frogs have been cloned from the cells of tadpoles. By the end of 1970s, the cloning of sheep and cattle embryos was possible. Then in 1993, at the autumn meeting of the American Fertility Society in Montreal, Drs. Jerry Hall and Robert Stillman of George Washington University first reported the cloning of human embryos.

Basically, there is nothing new about cloning techniques using the embryo. As embryonic cells are the product of the normal process of the fusion of a sperm and an egg, they represent information gathered from both the mother and father. The natural cloning of the embryo may occur in the mother's womb, resulting in multiple pregnancies, hence begetting twins, etc.

However, what Hall and Stillman managed to do was, after fertilization had been artificially induced in the test tube, the process of cellular division and differentiation of the embryo was temporarily halted. These cells were then separated. If each had been reinserted into the mother's womb for further division and growth and after a period of gestation, each cell originating from the same embryo would have produced a new individual or clone.

Table 1: Some Notable Milestones in Artificial Reproductive Technology Research and Cloning

Year	Milestone Achieved
B.C.	Parthenogenesis or 'virgin birth' of Mary/Maryam mother of Jesus/Prophet Isa a.s. reported in the Quran and Bible
1799	Pregnancy reported from artificial insemination
1944	First attempt at <i>in vitro</i> fertilization
1949	Researchers discover glycerol can be used to freeze sperm for later use
1951	First successful transfer of an embryo from one cow to another
1952	First calf produced using frozen semen Frogs cloned from the cells of tadpoles
1953	Frozen sperm used for human artificial insemination
1959	Live rabbit offspring from <i>in-vitro</i> fertilization
1970	Mice embryos are cloned
1972	Live offspring from frozen mouse embryos
1973	First calf produced from a frozen embryo
1978	First test-tube baby, Louise Brown, born in Britain
1979	Sheep embryos cloned
1980	Cattle embryos cloned
1983	A baby is born to a mother from an embryo formed by her husband's sperm and a donor's egg
1984	Australian girl named Zoe born from a frozen embryo
1986	Surrogate mother Mary Beth Whitehead of New Jersey (US) refuses to relinquish her daughter, sparking landmark court case
1993	George Washington University researchers clone human embryos
1997	The cloning of Dolly the lamb via Somatic Cell Nuclear Transfer (SCNT) at Roslin Institute, Scotland
1998	The cloning of female mice by Wakayama and colleagues
2000	PPL Therapeutics clone piglets for use as organ donors for ailing human
2001	The first cat is cloned by Mark Westhusin and colleagues at Texas A&M University, College Station
2001	The first human cloned embryos are declared, when a private company Advanced Cell Technology produced 6-cell embryos
2002	The rabbit joins the 'clonable animals club' ClonAid announced the birth of the first human clone, Eve. This remains unconfirmed

Table 1 (cont...)

2003	The first male mammal (a mule) is cloned Dolly the first cloned animal via SCNT is dead due to virus-induced lung disease
2004	A bull is cloned from a previously cloned bull (serial cloning) The first cloned human blastocyst is claimed to have been produced by a group in Korea (later retracted due to falsified data)
2005	The world's first cloned dog is revealed by researchers when South Korea's "king of cloning", Woo Suk Hwang successfully clones an Afghan hound. UK issues second cloning license to Ian Wilmut and motor neuron expert Christopher Shaw of the Institute of Psychiatry in London.
2006	Scientists at Harvard and the affiliated Children's Hospital Boston announce they have begun experiments with SCNT. By combining donated human eggs with skin cells from patients who have sickle-cell anemia or diabetes, the scientists will attempt to clone diseased cells and then to derive stem-cell lines from those cloned cells.
2007	World celebrates 10 years of cloning
2008	The Food and Drug Administration allows entry of food products derived from cloned cattle, swine, goats, sheep and their offspring into the U.S. food supply.
2009	President Obama affirms ban on human cloning, but signs an order to lift restrictions on federal funding for embryonic stem cell research.

Adapted from TIME Magazine, Nov. 8, 1993

However, the two scientists were not able to proceed beyond the petri dish, as all the cloned cells died before they were inserted into the womb. This was not unexpected as the embryos used were abnormal ones. In fact they only managed to get the go-ahead from the university's ethics committee to work on the project with the precondition that they used abnormal embryos. These embryos obtained from the *in vitro* fertilisation clinic were those from eggs that had been fertilised artificially by more than one sperm. Such flawed embryos were destined for an early death whether or not they were implanted.

Even though none of the 48 embryos cloned by Hall and Stillman survived more than 6 days, the report nevertheless managed to create a furor. For instance, a spokesman for the Japan Medical Association described the experiment as “unthinkable”. The then French President Francois Mitterrand was “horrified”. The Vatican’s *L’osservatore Romano* predicted that the procedure would lead humanity into “a tunnel of madness”. TIME magazine that made the news its cover story however tried to put the issue in perspective by commenting, “the controversy seems, in many ways, unworthy of a hoopla. It is not the Jurassic Park-type cloning many people might think of, in which genetic material from a mature individual - or DNA from an extinct dinosaur - is nurtured and grown into a living replica of the original. This is far beyond the reach of today’s science”.

It is true that despite the success of the Hall and Stillman’s method, its practical application in the field of reproductive technology seems to be rather limited as it still requires active, reproductive cells from both the mother and father. These cells must be healthy before fertilisation that results in a stable, promising embryo can take place. Some couples cannot even provide a good, healthy spermatozoon or ovum. Thus their infertility problem will not be solved by the ‘cloning of the embryo’ technique.

Then, there was the idea of cloning adult, mature cells that precluded the need for potent reproductive cells. But is this possible? Can a cell that has committed itself to specialise in a certain task be reverted to the status of an undifferentiated cell? Can it be reprogrammed so that it can give rise to not just one type of cells, but to all of the different cells that make up the individual? Reprogramming is thought to involve the shutting down of most, if not all, of the genes, before the new sets are switched on (Solter, 1998).

CLONING FROM ADULT CELLS - THE SCIENTIFIC BREAKTHROUGH

Undeterred by the ethical conundrums that it has spurred, the science of cloning continued to move forward, living up to the adage, "there is no stopping science". In less than three years after Hall and Stillman's success, Dr. Ian Wilmut and his team accomplished the seemingly far-fetched task of cloning from an adult mammal cell by successfully engineering the birth of Dolly, the ewe from Scotland. The *TIME* magazine creatively picked up the story and put the picture of Dolly and its mother-cum-clone on the cover with the caption, "Will There Ever Be Another You?" (read 'ewe').

The landmark achievement of Wilmut's work was to prove that a fully developed mature adult cell could revert to the embryonic stage and produce a full new being. This was previously thought to be impossible. The conception and birth of Dolly was devised by a substitution method known as somatic cell nuclear transfer (SCNT). The method begins by removing an actively dividing cell from the udder of an adult ewe. The activity of the cell is then temporarily halted by starvation. This process appears to be able to reverse the adult, diploid cell to the unspecialised or undifferentiated state. The nucleus of this cell is then inserted into an egg extracted from the ovary of another sheep. This egg was previously deprived of its nucleus, and therefore devoid of most of the DNA. The enucleated egg merely acts as a passive host for the udder cell. Note that no fertilization, or the fusion of a sperm and an egg has taken place. The 'pseudo-embryo' thus generated is then reinserted into the womb of a surrogate sheep, for it to develop into a full-term lamb (Figure 1).

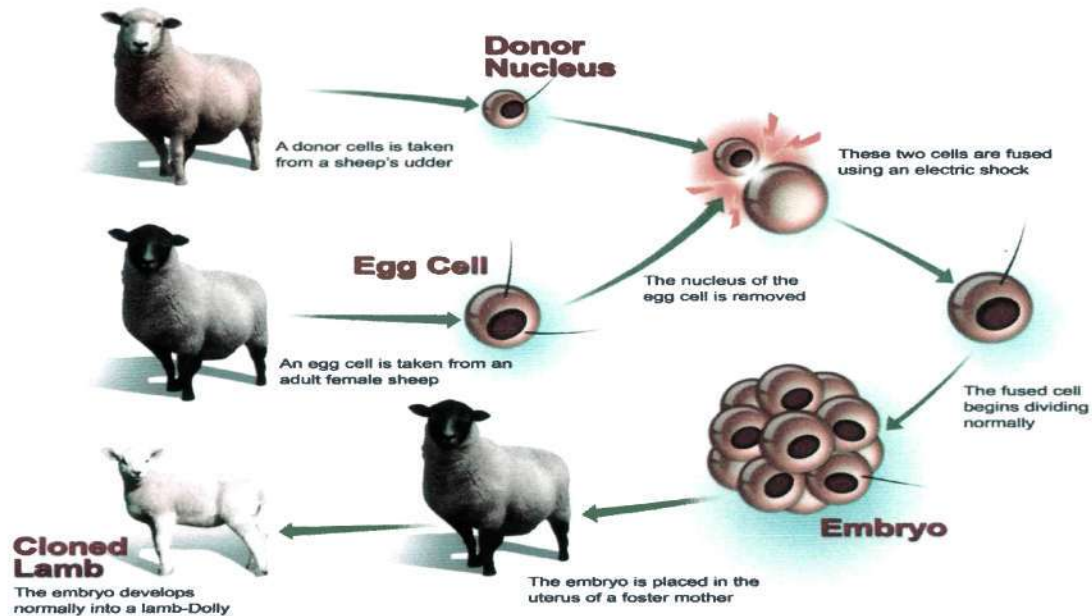


Figure 1: Schematic diagram for the production of a clone using the somatic cell nuclear transfer method (adult cloning)

The take home message here is - it may be possible to clone adult mammals in a completely asexual fashion. If this happens, then sex would become totally unnecessary, or just for pleasure! Women can elect to only clone female offspring leading to a world dominated by them. There is no need for sperms hence, men can actually become redundant, and may perhaps face extinction. Remember the science fiction movie 'Planet of the Apes'? Well, with cloning there is no stopping that this world may one day become 'Planet of the Eves' (coincidentally, the first claimed human clone was a female, called *Eve*). Women are still very much required for procreation, at least until man can devise an artificial womb. Sounds like science fiction perhaps. But in fact, science fiction has gone further than that. According to the sci-fi writer Adrian Berry, by the year 2022, human embryos could mature to term in incubators outside the mother's womb! That means not only would embryos be put together in the laboratory, the whole process of conception could also be outsourced to foetal incubators in the hospital. All the parents need to do is to visit the growing embryo every now and then. Maybe some time in the future, maternity leave will simply be a mere human legacy.

A further extension of the cloning possibility is the generation of an entire human from a bit of tissue, thus leading to another fanciful path that is the rising up of the dead. Ironically, the co-founder of the DNA structure and Noble Laureate Professor James D. Watson who visited Malaysia in 1996 was rather non-committal on such possibility. When the hypothetical question of whether it would be possible to recreate the dinosaur was raised during the dialogue session after one of his public lectures entitled "DNA and Life", Professor Watson was sceptical that such expectation would materialise.

Nevertheless, there is a cause for concern for cloning from adult living cells or tissues. In 1993, when the possibility of cloning human embryos was first reported, an article in a leading international magazine stated that, "Cloning ... in which genetic materials from a mature individual is nurtured and grown into a living replica of

the original ... is far beyond the reach of today's science". And yet within the following three years, that seemingly impossible task was accomplished with the cloning of Dolly - the ewe from Scotland.

On the feasibility of replicating the same experiment in human, the editorial of *Nature*, the weekly science-based journal which first reported the findings of Wilmut and co-workers in 1997, postulated that "cloning of human from adults' tissues is likely to be achievable any time from one to ten years from now". Some scientists at the time even claimed that it would take at least another 20 years for human cloning to be realised.

Nevertheless, in the true spirit of science where 'if there's a will, then there's a way', a scientist has come forward with a rather remarkable proposition. Dr. Richard Seed, a physicist from Chicago, announced the start of the study of human cloning, to provide custom-made babies for infertile couples. "It is my objective to set up a Human Clone Clinic in Greater Chicago, make it a profitable fertility clinic, and when it is profitable, to duplicate it in 10 or 20 other locations around the country, and maybe five or six internationally. We are going to have almost as much knowledge and almost as much power as God," Seed was reported to have told the National Public Radio during a broadcast in 1998. It seems that Seed's dream is almost a reality now, that is just 11 years after his broadcast.

Despite some major obstacles to the techniques of mammalian cloning, the possibility of successfully applying this method to human is very distinct. How did Seed intend to do this? A cell is taken from the father and its DNA collected. An unfertilised egg is isolated from the mother and the nucleus removed. The free paternal DNA that carries genetic information is fused with the enucleated egg cell with a spark of electricity. The DNA is then programmed by the egg molecules to produce an embryo. The embryo can be groomed to produce multiple cells which are then implanted into the mother's own uterus or some other surrogate wombs. The individuals that result are the replica or clones of the father (Figure 2).

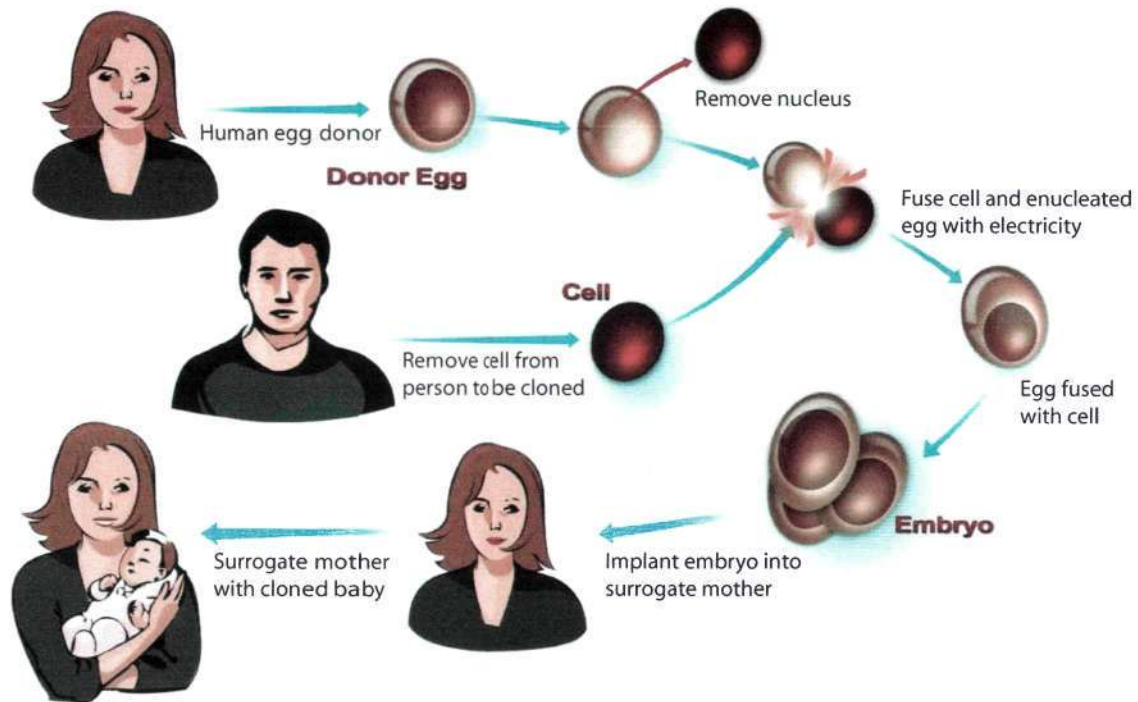


Figure 2: Schematic diagram of possible route to clone human via somatic cell nuclear transfer method (adult cloning)

Not surprisingly, strong objections to Seed's contention reverberated from communities around the world. The then US President ordered sanctions against the use of federal funds for human cloning research. The Europeans called for a total ban of the project. Religious authorities condemned the move and described it as "one more step toward the breakdown of the sanctity of human life, something similar to abortion".

Although Wilmut's findings were initially challenged by many scientists and even dismissed as a 'one-off', favourable reports after reports soon put the issue beyond doubt. For example, when researchers compared the DNA from the frozen udder tissue of Dolly's 'mother', the cell culture derived from it and Dolly's blood, they found that the three DNA samples were identical (Solter, 1998). Dolly indeed is a clone. One major setback of the Wilmut's method though, is the very high rate of failure. At Roslin, only one cell was successfully cloned out of 277 trials.

But the 'beat' (of cloning) goes on. A year after Wilmut's letter on cloning was published in *Nature*, a post-doctoral worker at the University of Hawaii, T. Wakayama and his colleagues reported a higher (2-3%) success rate for the cloning of mice (contrast to Wilmut's one success in 277 trials; with a success rate of approximately 1.3%) using the nuclear transfer method (Wakayama et al., 1998). This seemed to provide further encouragement for others to continue the search for a more reliable and economically viable cloning technique (see Table 1).

WHY CLONING?

There are several purposes for cloning. The fundamental driving force in the search for the absolute cloning technique is the wish to see infertile couples have children.

The second purpose of cloning relates to the use of cloned animals to help alleviate the suffering of humans afflicted with

diseases and abnormalities. Thus the report by PPL Therapeutics, a biotech firm based in Scotland, saying that it had cloned a litter of five genetically identical piglets might be the answer to the possibility of creating a limitless pool of rejection-free organs for transplantation (*TIME*, March 27, 2000). In the future, the availability of this type of transplants will probably reduce the need for huge doses of anti-rejection drugs normally required by organ recipients. Animals may be cloned in order to harvest potentially useful pharmaceutical products from them, for example, certain types of specialised proteins, hormones or chemicals. There is also a possibility of growing self-compatible cells to replace damaged cells or organs of an individual, for example, muscles or nerve cells for paraplegics and those with brain diseases, such as Parkinson's disease. This particular area of cloning is sometimes referred to as therapeutic cloning (although this aim runs contrary to the Animal Rights Movement *de raison d'être*).

Thirdly, the purpose of cloning is to improve the productivity of the livestock industry. Although this practice has been going on for some time now, the prevalent technique of cloning the embryo has been less successful. The feasibility of cloning using adult cells may provide better prospects in this industry in the future.

ETHICS

Before discussing the ethics of cloning, a brief review of ethics is probably worthwhile. Many, if not all, of the breakthroughs in the fields of pharmacy and medicine tend to raise profound ethical, theological and policy issues that need to be resolved. Ethical issues pertaining to the development in pharmacy, medicine and related fields, which are analysed from the viewpoint of relatively new areas of study are referred to as pharmacoethics, medical ethics and bioethics.

What is ethics? Bertrand Russel elegantly describes ethics as "in origin the art of recommending to others the sacrifices required

for cooperation with oneself". Ethics or the study of morality makes up one of the four main divisions of philosophy. Here it is further subdivided into categories of meta-ethics or theoretical ethics, that is the study of meanings of ethical terms and the forms of ethical argument; descriptive ethics, that deals with the study of moral and ethical beliefs and customs of different cultures; normative ethics, which is the study of ethical principles that have been accepted as norms or right behaviour; and applied ethics, that relates to the application of moral standards used in decision-making to concrete rather than abstract conditions (Beach, 1996).

The various moral questions pertaining to pharmacy, medicine and biological sciences in the contemporary world are clear indications that the time has come when ethical theorists can no longer ignore the gnawing problems of application. Similarly, those working within applied ethics can no longer operate effectively without taking theoretical considerations into account. This is especially true where principles and codes appear to make conflicting claims on the conditions or situations under examination. When such conflicting claims occur it is referred to as an ethical dilemma. When this occurs, we will have to resort to ethical reasoning that is, the process of analysis to determine what is right or wrong, and what the correct or more responsible choice is in a given situation. It is also an examination of our moral judgements and an attempt to determine the grounds on which these judgements are based.

The literature is filled with various classifications of ethical theories. For example, they can be classified as principle-based theories (normative ethics) and virtue-based theories (Beach, 1996). Principle-based theories are of either the deontological or consequentialist (utilitarianism) types. The former relates to the theory of obligation or duties, or rules and rights, while the latter links the rightness of an act to the goodness of the state of affairs. Judgements made may be general or specific. They are all normative as they affirm or apply norms or standards to making decision. They must be universal, applicable to all relevantly similar cases, impartial

and objective. The procedures to implement principle-based ethical theory are to identify ethical principles and evaluate ethical choices in terms of how well they fit with those principles.

Virtue-based theories include two principles: 1) communitarianism that applies Aristotelian approach where practical wisdom is employed in the reasoning process, and the focus is on the uniqueness of each ethical situation and based on shared community values or closed societies in which there are collective values shared by all, and 2) relationalism that emphasises the values of love, family and friendship inherent to the situation at hand. The procedure to do this is by identifying the ethically virtuous person, followed by evaluating ethical choices in terms of how well they exemplify the deliberations of the ethically virtuous person. This theory is very much situation-based.

If the above is true of ethics in contemporary philosophical thought, what about the role of ethics in religious teachings? According to Beach (1996), three ethical imperatives are embedded in the Judeo-Christian ethic through the 10 Commandments: 1) human welfare and beneficence which relate to the idea of helping others, protecting them from harm, healing their illnesses, or saving their lives, and the duty to promote good, prevent harm or non-maleficence and use the maximization of human happiness for the greatest number of individuals as the criterion for right action, 2) human justice which requires one to set fairness for all above benefit for some as well as fairness in implementing the law, and 3) human dignity and autonomy which relate to the idea of respect for others, including their rights to choice, freedom and privacy and protection of those with diminished autonomy.

Islamic, the philosophy also includes ethics, which is very much related to the religion. It significantly acknowledges the components of belief (*aqidah*) and law (*shariah*) of the religion. Shariah, by nature, evolves in tandem with the environment. Accordingly, Islamic philosophy also looks at the issues of virtue.

Virtues are divided into a number of classes, of which the highest is an uninterrupted contemplation and serene realisation of the Truth. Muslim thinkers also divided philosophy into the two generally accepted categories of 'speculative' and 'practical' and their discussions extended over diverse topics such as natural philosophy, mathematics, metaphysics and politics.

SECULAR BIOETHICS

Bioethics can be defined as the study of the rightness and wrongness of acts exerted in life sciences by applying both ethical theory and casuistry (case-study method) to the complex development in biological sciences. Bioethical approaches adopted today mostly derive their rulings from the normative and situational ethical principles. Similarly, using the same approach, there may well be the subject of 'ecoethics' for dealing with moral issues in the development of environmental sciences (Valvianos-Arvanitis, 2000) and 'technoethics', for issues brought up against the progress made in the technological sciences (Stanley, 1981; Jonas, 1993).

The word 'bioethics' was first coined by Professor Van Rensselaer Potter II, an oncologist, in an article, *Bioethics: The Science of Survival*, (Potter, 1970). After doing much work in the field of cancer research where he managed to establish links between certain types of cancer and environmental pollutants, Potter argued that a science of survival must be more than science alone. It should incorporate two ingredients namely, biological knowledge and human values. Later, Potter (1975) refined the definition of bioethics as a product of cross-fertilisation between the two branches namely, "medical bioethics" and "ecological bioethics". However, medical practitioners did not generally accept these concepts. They preferred to redefine bioethics to mean clinical ethics.

Thus from then on bioethics conjured a much narrower meaning than its original scope and breadth. It is in this context that many of the recent and contemporary discussions on issues related

to health, life and death are being looked at. This was particularly true during the era of heightened debates on reproductive sciences like contraception and abortion in the 1950s and 1960s. At the time, the founder-director of the Kennedy Center of Ethics at Georgetown University, Professor André Hellegers, seized the opportunity to turn bioethics into an academic discipline that reflected the needs of the time. This was rather easily acceptable as bioethics can readily be identified with the established field of medical ethics. In essence, medical ethics began with the advent of medicine itself, that is, the 'Hippocrates Oath'. Then there was the anti-vivisectionist movement (Koenig, 1999) that was already influential in the 19th century that helped to keep researchers who used animals as subjects for experiments on their toes.

According to Reich (1999), Hellegers's approach to bioethics is how he saw morality and medicine and biomedical sciences, that was taking the 'wider view' - a value-filled vision that integrated and gave meaning to what otherwise was disparate, precarious, and conflicting. Hellegers also struggled unsuccessfully to change the stand of the Roman Catholic Church on fertility control.

Additionally, in an effort to cater to the concerns regarding controversial scientific issues of those who do not subscribe to any religious principles, secular bioethics rather than religious ethics, appear to be a more acceptable notion. On this, Engelhardt (2000) wrote in his preface to the book, *The Foundations of Christian Bioethics*, "Hellegers turned bioethics into an academic discipline designed to function as a secular theology for an emerging high-technology culture. Through intensive courses, he provided one of the first 'seminaries' to train ethicists or bioethicists needed as secular chaplains for a morally transformed health care." Engelhardt went on to opine, "A new secular moral framework was emerging with deep connections with Europe's pagan past and the recapture of its cultural richness. Against the birth of this vigorous secular bioethics, Christian bioethics failed to thrive. After a brief flowering, Christian bioethics became largely indistinguishable from its secular versions." Thus Engelhardt (2000) proposed that bioethics be treated

as a way of life, sustained by a particular moral experience, albeit one of a transcendent God. The goal is to lead Christian bioethics back to where its reflections found themselves at the dawn of the first millennium.

ISLAMIC BIOETHICS

With regard to today's notion of bioethics, the Prophet Muhammad (peace be upon him) was reported to have commented on the responsibility of a physician, "A person who practices the art of healing when he is not acquainted with medicine will be responsible for his actions." In essence, the Muslims' contribution to what is now referred as bioethics might have been most prevalent during the Islamic civilisation between the 9th and 14th century. Many physicians and scientists doubled up as great philosophers. They include Avicenna and Averroes. Among other things, the issue of morality and ethics were discussed. Naturally these entities are directly related to the teachings of Islam. The annals of history do portray instances when bioethical issues had to be dealt with by Muslim scholars. For example, Muslim jurists such as Al-Imam Nawawi and Asshirbini are known to have sanctioned transplants of teeth and bones. Intra-species (allografts) and inter-species (xenografts) transplants of most organs were also permitted.

Indeed there was a period of decline of the Islamic civilisation from the 16th century or so onwards where the study of philosophy and other worldly knowledge was relegated to the lowest priority. Nevertheless, the advances in science and medicine soldiered on in the West. Naturally, these gave rise to numerous ethical issues and as the world grows smaller, these issues soon find their way back into the Muslim land. It was the Muslim legal scholars who usually had to deal with bioethical matters as the life of a Muslim and whatever that he or she may do, (Muslims believe that Islam is a complete way of life) including soliciting medical advice and adopting a treatment, is determined by the boundaries of the Islamic law or Shariah where every medical ethical issue must be consented, or otherwise, by

the Muslim scholars. For example, during the development of the transplant procedure in the 1950s, Islamic jurists from Al-Azhar University in Cairo consistently issued decrees to allow Muslims to adopt this type of treatment. The sanction began with the cornea transplant right up to the most recent heart replacement procedure. The willingness of Muslim scholars to deliberate on these real, practical issues with an open mind helped to facilitate Muslims' acceptance of modern medical procedures.

But this is not to say that the open-mindedness and acceptance of modern medicine is across the board; insofar as the scholars are concerned. There are Muslims who prefer to adopt rulings made by conservative scholars who would not normally take too kindly to modern medical methods of diagnosis and treatment. Despite the spacious room given by Islamic teachings on the interpretation of religious tenets which can be based on the Quran, hadith (traditions of the Prophet Muhammad), *ijma'* (consensus among Muslim scholars), *qiyas* (analogy) and other principles (such as public interests), the conservative attitude coupled with myopic approach tend to place Muslims into the realm of orthodoxy and complacency. This stand actually has nothing to do with medical ethics, but rather to the inability to grasp and move with the rapid expansion and enrichment of knowledge.

One of the major reasons for this persistent malaise is the less emphasis given to Muslims to strive in the field of modern knowledge. Some Muslim scholars even opine that the study of science gives rise to secularism although this opinion contradicts the basic teachings of Islam that encourage Muslims to study the earth and the sky and whatever is between the two. In short, it was not Islam, but the Muslims themselves who opted for a self-imposed stagnation and recession in terms of knowledge acquisition.

For example, on the use of vaccines, today, there are Muslims who adopt the stand that this is not allowed in Islam. The reason given is that the vaccines originate from a religiously impure source. However, Islamic scholars rule that even if the vaccines were to

have originated from a swine, and as long as there are no other credible alternatives to it, the Islamic teachings permit their use. Further, Muslim scholars issued religious decrees permitting the use of organs and tissues derived from impure sources for transplants a long time ago. As a matter of principle, Muslims are forbidden from consuming products containing porcine-derived substances, as a pig is considered an impure animal. However, the majority of scholars agree that when it is the only option available, medications or tissues derived from the swine may be tolerated. Thus the swine's skin has been used for transplant in cases of burn. Similarly, more than a thousand years ago in Iraq, the grand judge Zakaria Al-Qazwani allowed the use of porcine bone graft as it functioned more efficiently (Albar, 1996).

More recently, in the 1970s, commercially available insulin for use by diabetic patients was prepared from the swine's pancreas. Because of its high purity, compared to the bovine insulin, porcine insulin became the drug of choice for patients sensitive to allergic reaction. Again, Muslim scholars approved the use of porcine-based medications in extreme situations. These forms of prevention, or treatment, of life-threatening diseases have been proven to be effective. The Islamic injunction is clear on this. A life must be saved at all cost. The use of alcohol in drug preparation too was a bane in the Islamic health system. It took a long time to convince the Muslims of the difference between alcohol consumed as liquor and alcohol prepared for use as medical products.

Similarly, immunisation is a medical issue that has received a great attention of Muslims. It was originally looked on suspiciously for fear of the inclusion of porcine-derived substances in vaccines. This stand was altered when *fatawa* or official religious rulings were issued permitting Muslims to accept immunisation as a form of prevention against debilitating diseases such as measles, tuberculosis, pertussis, diphtheria, tetanus and polio. The *fatwa* on vaccines also pronounces that whenever possible, these vaccines should be obtained from pure animals or materials. Otherwise, vaccines from impure sources can be used.

These rulings have been made based on various injunctions of the Islamic teachings. One such injunction is spelt out under the five main purposes of the Islamic law, one of which relates to the protection of life. The use of vaccines has become a standard practice in the world's primary health care system, and the effectiveness of immunisation in terms of preventing diseases has been tremendous. Morbidity and mortality rates of almost all diseases have been drastically reduced. This type of preventive medicine is also very much encouraged by the Prophet Muhammad (pbuh). The Islamic medical literature is replete with the Prophet Muhammad's sayings and traditions on preventing the spread of diseases. Thus the concept of preventive and promotive medicine aimed to avoid the rush to cure a disease, unnecessary sufferings and losses is accepted in Islam.

Another example is on the issue of tissue and organ donation and transplant. Organ transplant is a mode of treatment for serious and life threatening diseases that has been proven successful, and hence should be employed. Recent advancements in surgical procedures and the availability of anti-rejection drugs have contributed tremendously to the success of organ transplant. The primary source of organs for transplant is a dead body. As death sets in the organs of the body putrefy rapidly. Thus if possible, organs must be retrieved from a dead body whose vital functions are being sustained artificially. Such bodies are often of patients who die after a trauma that destroys their brain but leaves other organs intact. The term 'brain-death' or cadaveric is used to describe these bodies. Return to life is considered scientifically and medically impossible. Very strict brain related criteria are used to certify that a patient is brain-dead. And these criteria have been internationally accepted and widely practised. The heart transplant procedure today boasts of a survival rate of 90 percent for the first post-operative year, 75 percent the fifth and 55 percent the tenth.

Muslim scholars have, after having consulted the medical experts, made the decision to allow organ transplants based on acceptable juridical principles. The first principle is 'choosing the lesser of the two evils if neither can be avoided'. Since the saving

of life is a necessity that carries more weight than preserving the integrity of the body of the donor or cadaver, and inflicting injury on the body of the donor is less evil compared to letting the patient expire, organ transplant is therefore sanctioned. However, as far as possible, the procedure should not pose any danger on the living donor. Here, the main principle of medical ethics namely, 'primum non nocere', is automatically invoked. Donation must cause no harm or any increased risk, however minimal, to the health of the donor.

The second rule is 'necessities overrule prohibitions'. Basically, mutilating the human body, whether living or dead, is against the precepts of Islam. The Prophet Muhammad rebuked a man who broke the bone of a deceased that he found in the cemetery and said, "breaking the bones of a dead man is similar to breaking the bones of a living man". Due respect should be accorded to the dead body as exemplified by the Prophet who stood in veneration for a passing by of a funeral of a Jew, at the time when Jews were his bitter enemies. One of the companions exclaimed, "It is only a funeral of a Jew!" The Prophet answered, "Is it not a human soul?"

Nevertheless, under very special circumstances, juridical prohibitions on harvesting organs from a dead body can be waived. God says in the Holy Quran in Surah Al-Baqarah: 173, "But if one is forced by necessity, without wilful disobedience, nor transgressing due limits, then he is guiltless. For God is Oft-Forgiving and Most Merciful". A similar decree is stated in Surah Al-Maidah: 3 and Surah Al-An'am: 145. Donating an organ is not an act of mutilation. Mutilation is done with malice and vengeance and serves no good purpose, while donation of an organ is an act of charity and benevolence as it can save a human life. In Surah Al-Maidah: 32, Allah says, "If anyone saved a life, it would be as if he saved the life of all mankind."

The third principle that lends support for organ transplants is contained in Surah Al-Baqarah: 185, "Allah intends every facility for you. He does not want to put you to difficulties." Islam considers a

disease as a natural phenomenon. God who causes ailment also brings cure and redemption. Muslims are therefore encouraged to search for new modes of treatment and should apply them if proved successful. Based on these justifications, organ donation and transplant are acceptable in Islam. The same can be said of many other bioethical issues. A proper search of various Islamic legal sources can provide necessary insights into the true perspective of the seemingly tough bioethical dilemmas.

ETHICS OF CLONING

While proliferating via natural sexual means is totally acceptable, what about doing the same through asexual method? This is what the more advanced stages of artificial reproductive technologies have managed to accomplish. As described previously, the latest development in cloning procedure allows the use of a non-embryonic or an adult cell of an animal to produce its offspring in an asexual manner. A further extension of this would be the possibility of generating an entire human from bits and pieces of a tissue. This idea first came to light in Francis Bacon's book *The New Atlantis*, published in 1622. In it, the author describes a future science that uses the existing forms of biological life as raw materials from which to redesign nature.

Then there is a possibility of introducing genetic materials from one species into another, meaning the creation of a new species with mixed features known as chimeras. If a human cell is mixed with that of an animal, what will it be? A 'man' or a 'manimal' (man-animal)? How much of a manimal's physical trait qualify him (it?) to be referred to as a 'human'?

The revelations by Hall and Stillman of the possibility of human cloning were undeniably the triggering point of a great ethical debate. Although the two scientists justified their effort by claiming that their experiment was "simply to take the first step toward determining if cloning is feasible in humans as it is in cattle",

ethicists were not satisfied. They continued to keep a watch on such possibility. The findings of Wilmut and colleagues only served to add credence to their concern and anxiety. It also helped fuel the already flaring controversy. But looking at the issue rationally, there are essentially two important questions pertaining to cloning. Firstly, is therapeutic cloning of animals desirable? Secondly, is reproductive cloning of humans permissible?

First, looking at therapeutic cloning, in the last two centuries, it has become necessary to use animals for experimentation and in a limited fashion for harvesting tissues. With controlled laboratory studies, major findings relating to diseases and therapies have been obtained. Animals may one day be cloned as organ and tissue suppliers for humans. Recent reports have indicated that cloned piglets may be the answer to the acute shortage of organs available for transplant. Naturally, if and when the problem of incompatibility is resolved, the practice of harvesting tissues and organs from cloned animals will become a standard procedure.

In essence, the use of animals for these purposes is relevant because of their somewhat similar physiological properties to man. In the Holy Quran, Allah states, "There is not an animal that lives on the earth, nor a being that flies on its wings, but forms part of communities like you. Nothing have We omitted from the Book, and they all shall be gathered to their Lord in the end" (Al-Quran: Surah Al-An'am: 38). In another verse relating to animals Allah says, "And He has created horses, mules, and donkeys for you to ride and use for show, and He has created other things of which you have no knowledge". Thus the Holy Quran proposes that man should study the animal kingdom to learn and benefit from the secrets of Allah's creation. Animals cloned for therapeutic purposes or to improve the livestock would also fall into this category.

Nevertheless, in the field of scientific experimentation, the use of animals has now been tremendously minimised with the development of computer software that can simulate laboratory experiments. Furthermore, inanimate materials are being actively

developed for the purpose of research to replace the use of live animals. In any case, man is considered responsible towards the animals under his care. Allah says in the Holy Quran, "And they feed for the love Allah, the indigent, the orphan, and the captive." (Al-Quran: Surah Al-Insan or Ad-Dahr: 8). The latter includes animals which are under subjection to man.

The second and more pertinent question is reproductive cloning. The issue before us now is that, if and when such a clone exists, he or she by definition would be considered as a non-sexually produced descendant of a man or woman. Clearly in Islam, this is not permissible. Man is indeed a natural creation, for Allah fashioned Adam out of baked clay, which when organized into a human being produced from an extract (*sulaala* or semen). It is this semen which, when injected into the womb, would undergo fusion with the woman's egg. In fact this phenomenon of reproductive biology and embryology was eloquently described in various Chapters of the Holy Quran more than 1,400 years ago, much to the amazement of the present-day anatomists and embryologists. For example, Surah Al-Mu'minun: 12-14 state, "And certainly, We created man from an extract of clay. Then We made him a small life-germ in a firm resting place. Then we made the life-germ a clot, then We made the clot a lump of flesh, then We made in the lump of flesh bones, then We clothed the bones with flesh, then We caused it to grow into another creation. So blessed be God, the Best of Creators".

Thus procreation of the human species is part of the divine plan. Nothing happens other than willed by Allah. The Holy Quran states, "To Allah belongs the dominion of the heavens and the earth. He creates what He wills and plans. He bestows children male or female according to His will and plan. Or He bestows both males and females, and He leaves barren whom He wills: for He is full of knowledge and power." (Al-Quran: Surah Ash-Shura: 49-50). Clearly, some people may not be able to bear children but nevertheless they can if it be the will of Allah. Childless Muslims, as a rule, are hopeful that they, like Prophets Ibrahim and Zakariyya,

would one day be blessed with children. Hence, their very first move is to beseech Allah to cure them of their infertility.

However, cloning would not fall under the category of trying to resolve the problem of infertility. For it may be motivated for the satisfaction of one's own personal ego - to have one's own clone. Manipulating human progeny may be targeted at cultivating physical characteristics considered desirable, leading to elitism and discrimination against normal individuals who lack those characteristics (Hathout, 1995). What will be promoted is conservation of traits, as opposed to diversification that occurs through natural reproduction. Producing children in that manner would threaten the very institution of marriage and family, and in view of that would be an illegal venture under Islamic Law.

Nevertheless, Islamic law does maintain the importance of fertility in marriage. The ability to bear children is the foundation of a healthy and happy family. According to a hadith, Prophet Muhammad (pbuh) reproached a sterile man for not informing his wife, prior to the marriage, that he was incapable of begetting children. The Prophet (pbuh) instructed the man to "let his wife know and consequently let her choose". The women were legally justified on the basis of this information, to refuse to remain married to the sterile man. Every man and woman is entitled to a productive marriage, and the law strongly defends this right. Therefore, it is not surprising that infertile Muslim couples have become highly interested in artificial insemination as a means of helping them to produce the desired child.

Islamic law is quite clear on artificial insemination. In case whereby the husband's sperm is artificially transferred to his wife, many Muslims legalists permit this. Bringing about pregnancy by means other than direct sexual contact is perceived as neither interfering with the Creator's acts, nor contesting God's wish and decree. On the contrary, Islam requires that mankind be happy. Artificial insemination is made possible via knowledge bestowed by

God. Medicine alone has not been able to produce an egg or semen. It can only improve the way the two unite, after God has created them. If God had not so wished, artificial insemination would not have succeeded.

Islam also puts much emphasis on matrimony which precedes the union of man and woman. The criteria for the selection of future spouse are clearly spelt out, especially in terms of age, attractiveness, fertility and religious commitment. This is to ensure the continuity and preservation of human race of the highest quality. A legitimate child is also highly desirable as he or she may turn out to be the saviour of the dead parent in the hereafter. Islam also tries to maximise the quality and virtues of future descendants by discouraging marriage between close relatives and prohibiting matrimony between two person related by blood. These reminders are truly valid with the recent findings of genetically-linked diseases such as Alzheimer's and Huntington's diseases. Marriages between close relatives carrying the genes of the disease tend to tremendously increase the chance of bearing offsprings with the disease.

Thus at a seminar on "Islam and Ecology" organised by the Center for World Religions, at Harvard University, a Muslim scholar who spoke on the topic of "Genetic Engineering, Cloning and Al-Mizan (the Balance)" argued that since reproductive technologies such as cloning interfered with the natural reproductive process of human beings and preordained by the Creator, then these should not be adopted by Islam (Parvaiz, 1998).

This stand is similar to that of Kass (1972), "there are more and less human ways of bringing a child into this world. I am arguing that the laboratory production of human beings is no longer human procreation, that making babies in laboratories - even 'perfect' babies - means a degradation of parenthood." This view is not unlike that opined by Britain's Prince Charles on genetically-engineered crops, which he criticised for taking mankind into "the realms that belong to God and to God alone." The heir to the British throne wrote in an article for the London Daily Telegraph, "I personally have no

wish to eat anything produced by genetic manipulation, nor do I knowingly offer this sort of produce to my family or guests.” (The STAR, June 9, 1998, p. 28).

However, diametrically opposed to this naturalistic viewpoint, there are those who regard the rational control of nature as one of the major achievements of human beings. According to this view, the ability to minimise the uncertainties and unpredictable aspects of human reproduction is one of the major achievements of human beings.

This is reflected in Fletcher (1974), “Should we leave the fruits of human reproduction to take shape at random, keeping our children dependent on the accidents of romance and genetic endowment, of the sexual lottery or what one physician calls ‘the meiotic roulette of his parents’ chromosome?’ Or should we be responsible about it, that is, exercise our rational and human choice, no longer submissively trusting to the blind worship of raw nature?”

The third position tends to mitigate the two extreme viewpoints. While it accepts the natural reproductive process as preordained, and should be the best for the human interest, this middle-of-the-road position also argues that the development and use of innovative reproductive technologies can be morally justifiable, depending on the circumstances and on the reasons adduced. As human beings are prescribed to procreate and propagate, then there is no harm in adopting these technologies in an effort to cope with some of the uncertainties and inconveniences of the natural world.

STEM CELLS RESEARCH

In 2007, the United States of America's Senate voted to ease restrictions on federally funded embryonic stem cell research. Then recently, President Barack Obama affirmed the ban on human cloning, but signed an order to lift restrictions on federal funding for embryonic stem cell research. This move is expected to be able

to provide a new impetus to scientists to enhance research on stem cells. It is argued that this area of research is crucial in getting insights into some of the most debilitating diseases known to man. These include diseases such as Parkinson's, motor neuron, Huntington's and Alzheimer's.

In 2007, a breakthrough finding was published in the Journal of the American Medical Association on the management of diabetes. The study was conducted by Northwestern University, Chicago, involving Brazilian patients. Diabetics lack insulin due to defective pancreas. For some diabetic patients, only an insulin injection can help maintain an acceptable good glucose level. Young patients treated with stem cells obtained from their own red blood cells (otherwise known as adult stem cells) seemed to be able to get on with life without the need for insulin injections.

Stem cells are the early stage cells created when a sperm fertilises an egg. They are generalised mother cells that can give rise to descendants, which then morph into different cells, tissues and organs. Research on stem cells is vital to understand the mechanics of the earliest stage of human development. Scientists wish to know how genes steer the synthesis of proteins to execute the different cellular functions during development, and why some fail to do their prescribed jobs, leading to defective embryos, hence diseased offspring.

How do scientists obtain supplies of stem cells for research? First, it is with proper consent from the couples who have undertaken *in vitro* fertilisation (referred to as test-tube baby) procedures, the stem cells are isolated directly from human embryos. The second source of these cells is foetal tissues of terminated pregnancies. Cells from the region of the foetus destined to develop into testes or ovaries are collected. The third avenue is through the cloning of mature cells or somatic cell nuclear transfer method.

Stem cells research is expected to provide the ability to generate cells, tissues and perhaps organs, that may be used for so-called “cell therapies” in the form of transplants or replacements. This is what happened in the Northwestern-Brazilian study. Despite the obvious advantages of stem cells research, previously, research on stem cells was either not allowed or strictly controlled. This is in view of the sensitivity of the issue.

Stem cells have the capability to develop into any type of tissues, as well as grow into a full-blown human being. Hence, there is the dilemma of balancing between the ethics of healing and the ethics of protecting life. In Germany, a human embryo is protected by law from the fertilization to the implantation stage. Italy and Austria too, are among the least permissive countries for stem cells research.

In the United States, hitherto laws forbidding the use of public funds to obtain stem cells from human embryos were relaxed in 2001, where the use of stem cells that no longer had the possibility of developing further as a human being was allowed. Similarly, a British panel of experts produced a report urging the government to allow stem cells research for therapeutic purposes. This study would help bolster the prospect of therapeutic cloning that could develop new treatments for diseases.

Britain allows her scientists to conduct research on embryos up to 14 days old for certain disorders. In its report published on August 16, 2000, the expert panel proposed keeping the 14-day rule and introduced new legislations to reinforce the nation's ban on creating cloned babies. Upon recommendations of the UK Stem Cell Initiative, conducted by Sir John Pattison, the British Government announced that £100m would be made available for the UK stem cell research for an initial period of two years. The Human Fertilisation and Embryology Authority (HFEA) granted the first UK license for therapeutic cloning to the Centre for Life, Newcastle upon Tyne in August 2004. The second license was awarded to the Roslin Institute, Edinburgh (the place where Dolly was cloned), in February 2005.

In addition to the many technical posers, ethical dilemmas associated with the use of stem cells for research are equally complex. One of the issues constantly brought up is: What is the moral status of the organisms created by cloning? Theoretically, if the embryos developed by somatic cell nuclear transfer were deposited in the womb, this would possibly lead to conception of clones.

However, it has been argued that unlike an embryo, a cloned organism is not the result of fertilisation of an egg by a sperm. It is a new type of biological entity never before seen in nature. Although it possesses some potential for developing into a full human being, this capacity is very limited. At the blastocyst stage, when an organism is typically disaggregated to create an embryonic stem cell line, it is a ball of cells no bigger than a full stop at the end of this sentence. It has no organs, it cannot possibly think or feel, and it has none of the attributes thought of as human. It should not be likened to an embryo, as it is only an "activated cell".

Ibn Al Qayim who lived in the 14th century raised a similar question in his book, *Medicine in the Laws of the Quran*, "If it is asked: Does the embryo before ensoulment possess life? It is answered that it has the life of growth and nourishment like a plant. But once the soul enters the body then it has the sense of perception and volition, which constitute the basis of human life". Similarly, Ibn Hajar Al Asqalani argues that the liver is the first organ formed in the embryo, as it is important for growth and nourishment. The formation of the brain, in his opinion, comes at a later stage when the soul enters the foetus.

It is intriguing to find these Islamic religious leaders linking 'ensoulment' to the formation and integration of the nervous system, where the centres of perception and volition are found. A study of multiple sections of different aborted foetuses showed that synapses or nerve junctions in the brain did not propagate impulses except at the beginning of the 20th week of conception computed from the last menstrual period, equivalent to 120 days from fertilisation.

The 120th day is also the time when, according to the sayings of Prophet Muhammad, human life begins. Prior to that moment, the embryo has sanctity, but not reaching that of a full human being. By referring to religious texts, scientists and the public may be appeased when having to deal with ethical issues in research. An open view of the interpretations may avoid unnecessary obstacle to scientific endeavours.

DEATH - AND THE RIGHT TO DIE?

On 22nd November 1998, American television viewers, for the maiden time, had a first-hand look at death. The televised mercy-killing of Thomas Youk, on '60 Minutes' at the hands of Dr. Jack Kevorkian, otherwise known as Dr. Death, not only reopened the floodgate for debates on physician-assisted suicide, but rekindled a more general discussion on the scientific and religio-ethical perspective of death and dying.

Death is inevitable. It is looked upon by most as the ultimate tragedy. However, there are those who take a more philosophical approach to it. "He who pretends to look on death without fear lies. All men are afraid of dying. This is the great law of sentient beings, without which the entire human species would soon be destroyed." These were the words of the 18th-century French philosopher, Jean-Jacques Rousseau, uttered more than 200 years ago (Twycross, 1992). In a way, the reality of death is the absolute deterrent for human beings to engage in heinous crimes and despicable acts.

Even doctors, who are the guardians of health, cannot escape death, as echoed by Shakespeare's "by medicine life may be prolonged, yet death will seize the doctor too," and Ibn Sina's "knowledge of health preservation helps neither in avoiding death nor in escaping from external afflictions."

Today, as we enter the 21st century, death remains life's ultimate riddle, but why is it inevitable? While modern science can

explain why we age, it tells us very little about why we die, much less about what happens after death.

The Science of Death

Death is defined as the final, irreversible end of life. It represents the ultimate cessation of vital functions of the body. The earlier criterion used for determining death was the permanent ceasing to function of the heart and lungs. So, in those days, when a person stopped breathing, the heart stopped beating for more than a few minutes, the loss of function became irreversible, so that person was declared dead. The loss of oxygen to the brain would almost instantly produce irreversible brain damage and loss of all cognitive function (Brock, 1993).

However, the introduction of new medical technology, and most importantly the respirators, has enabled modern medicine to continue patients' heart and lung function artificially after they would no longer work on their own. This can often save lives that previously would have been lost. Sometimes, it may even permit the patient to recover a normal level of functioning.

In other cases, however, heart and lung functions can be restored or continued by these artificial means. For example, after the brain function has been partially or completely destroyed from prolonged loss of oxygen or severe trauma of the brain. Such possibilities have forced a rethinking of the traditional criteria for the determination of death. So today, there is an additional criterion for death, that is, the complete and irreversible loss of all brain function, or so-called brain death.

The concept of brain death was first proposed by a team of French doctors in 1959. The criteria adopted for brain death were coma, cessation of breathing, and the absence of these: brain-stem and tendon reflexes, and electroencephalographic (EEG) waves. If these conditions persisted in the patient for more than 24 hours, then he or she would be pronounced dead and the ventilator switched off even though the heart might still be beating.

Further discussions led to the announcement at the 22nd World Medical Assembly in Sydney in 1968, which in a nutshell, stated that death had occurred if there were no means of saving the patient, regardless of whether some of his organs might still be functioning. In the same year, the Harvard criteria to determine death were introduced. In addition to the French's original criteria, the Harvard's stipulated that there must also be an absence of the pupil and spinal reflexes, no movement of the patient for an hour, and that breathing should cease 3 minutes after the ventilator had been switched off (Jusoh, 1998).

Signs of death are most tangible several hours after the disappearance of vital signs, such as breathing, the beating of the heart and brain function. The body goes into a state called *rigor mortis*. The muscle contracts and becomes rigid. The rigidity remains until muscle proteins are destroyed by certain enzymes 15-25 hours later. This whole process occurs more rapidly at higher temperature (Guyton, 1991).

Although dead bodies are normally buried or cremated, there is now a move to preserve them. Cryonics is the practice of freezing a dead diseased human in hopes of restoring life at some future time, when a cure for the disease has been developed. For example, at the Trans Time Clinic in Oakland, California, clinically dead bodies are frozen in 'suspended animation' in liquid nitrogen at minus 145° C within a few hours of death. They have only one hope; when a cure for their diseases has been discovered, and death may hopefully be reversed, they may come to life again (Smolan *et al.*, 1990).

In order to understand the Islamic perspective of death, one has to first consider what Islam says about its other half that is, life. Allah has created man and provided him with a transient home on Earth, a tiny part of his vast universe. "Behold," your lord says to the angels, "I am about to create a man, from sounding clay and mud moulded into a shape, and I have fashioned him in due proportion and breathed into him of my spirit." (Al-Quran: Surah Al-Hijr: 28).

Man is Allah's vicegerent on Earth. This is clearly evidenced in his faculties, such as the power to reason and of speech. Through these benefits, Allah appoints man as the temporary authority over the rest of the creation. Man understands his life process involves a journey. The journey begins at birth and comprises man's destiny on Earth. It is the journey of action and experience, as man travels down the course of his own lifetime to its inevitable end; "We belong to Allah, to Him we will return." (Al-Quran: Surah Al-Baqarah: 156).

As he pursues the course of his life, he develops a character and a distinct personality. When a man follows a course of righteousness and godliness, which he is free to choose through his power to reason, his reward will be the paradise. On the contrary, choosing the path of godlessness and evil will procure an afterlife that bodes of pain and misery (Maududi, 1986; Herlihy, 1990).

Thus Muslims consider themselves on a mission on Earth, and they are committed to this mission by their belief in Allah the Creator. They have a responsibility to fulfil and trust to maintain. The trust is the full commitment to life. They must care for life in all possible ways. Islam has made human life sacred and has safeguarded its preservation. According to the Islamic teachings, aggression against human life is one of the greatest sins in the sight of Allah. The Quran declares, "If anyone killed a person for any other reason than for (the killing of) a person or for sowing corruption in the land, it would be as if he had killed the whole of mankind. And if anyone saved a life, it would be as if he saved the life of the whole people." (Al-Quran: Surah Al-Maidah: 32).

Muslims are prohibited from inducing discomfort to his fellow human beings. The sin of a murder is not limited to the murderer alone. Each individual who participates in the crime, by deed or by word, will have to bear Allah's punishment in proportion to his part in it. Even a person who happens to be at the scene of the murder will have to bear part of the sin for not defending the victim. The sacredness of life, however, is in equilibrium with the sanctity of

death. "Wherever you are, death will find you out, even if you are in towers built up strong and high." (Al-Quran: Surah Al-Nisa': 78).

Man is but mere mortal. Death is indeed inevitable. The Prophet Muhammad (pbuh) urged Muslims to constantly think about death, as this would make them appreciate life and avoid doing mischief. Nevertheless, the Prophet (pbuh) disapproved of those wishing for death. Anas reported the Prophet (pbuh) as saying, "No one of you should wish for death for any calamity that befalls him, but he should say: O Allah! cause me to live so long as my life is better for me; and cause me to die when death is better for me (Hassan, 1988). The time of death of each individual is predestined by Allah. "Nor can a soul die except by Allah's leave, the term being fixed in writing. If any do desire a reward in this life, We shall give it to him; and if any do desire a reward in the Hereafter, We shall give it to him". (Al-Quran: Surah Ali-Imran: 145).

Death - The Unnatural Way

While most people succumb to death due to diseases or accidents, there are others who choose or have to choose to terminate life by unnatural means. Two such examples are suicide and euthanasia, or mercy killing.

Suicide

An act or omission is a suicide if a person intentionally brings about his or her death, unless the death is coerced, or is caused by conditions that are not specifically arranged by the agent for the purpose of bringing about the death (Beauchamp, 1993). A person is said to commit suicide when he or she believes that the act will result in self-caused death, and the death must occur in accordance with the agent's plan, or suicidal intent, to produce his or her death. Suicidologists, those who study the different aspects of suicide, add another dimension to the above definition, that is, suicide occurs only if the person committing the act sees it as the best way out of certain problems.

As for the ethics of suicide, four principles have been proposed. The first is the principle of utility, which looks at the consequences of actions in order to gauge the impact of the action on the interests and welfare of all concerned. The interest of the person contemplating suicide, and the interests of the dependents and relatives are all considered to calculate positive values and disvalues of the suicide. Positive disvalues may be in the form of grief, guilt and deprivation, while positive values may be that the person is a loner, and suffering from massive and uncontrollable pain. This principle accepts suicide if positive values outweigh disvalues.

The second principle is respect for autonomy. This urges for acceptance of the decision-making capacities of autonomous persons by not hindering their liberty to make their choices. Proponents of this principle believe that autonomy takes precedence over all other moral considerations.

The third principle is respect for life. It is wrong under all circumstances to terminate human life intentionally, whether by capital punishment, in self-defence, or through abortion. However, this principle does not assert that it is always wrong to allow someone to die instead of attempting utmost efforts to save the person. If someone is terminally ill and is destined to die imminently, it may be acceptable to allow him to die, by depriving him of any medical support. Thus a more relevant expression of this principle would be; respect for life and death.

The fourth is the theological principle, which prohibits suicide because it violates the direct command of God against the taking of human life. Humans receive the gift of life from God, and therefore committing suicide is considered committing sins against their Creator by the act of destroying themselves. Suicide is akin to murder, only that it is a form of 'self-murder'. As murder is specifically prohibited by God, thus suicide is morally wrong.

Suicide is forbidden in Islamic law. These Quranic words indicate the prohibition of taking one's life: "and do not cast yourselves into destruction." (Al-Quran: Surah Al-Baqarah: 195).

Also: "nor kill (or destroy) yourselves." (Al-Quran: Surah Al-Nisa': 29).

According to Islamic law, Allah is the Creator of life. A person does not own his or her life, and therefore cannot terminate it. The only way a Muslim can freely give and take life is in the "path of Allah", as martyr in *jihad*.

Islam requires Muslims to be resolute in facing hardships. They have been created for striving, not for sitting idle; for combat, not for escape. His faith and character do not permit him to run away from the battlefield of life. How long we spend on Earth is not for us to determine. The life of a Muslim belongs to the Creator and they can neither shorten nor prolong it. A person committing suicide may appear to end his own life, or that medical treatment may have helped him recover, but it is a fundamental Islamic belief that a person's life ends only when Allah decides that it should end.

Euthanasia

Euthanasia or mercy killing may be active or passive. Active euthanasia means patients are deliberately killed, for example by injecting an overdose of sedatives. Active euthanasia is normally voluntary, where the patient with a rational frame of mind, requests death and is killed accordingly. Passive euthanasia happens when a patient is deliberately allowed to die from whatever ills he is suffering from, such as refusing to perform surgery, initiate heart resuscitation procedure, or administer medication. Passive euthanasia may be voluntary, when the patient consents to it, or non-voluntary, when he does not express the desire to die.

Physician-Assisted Suicide (PAS) made famous by Dr. Jack Kevorkian, or Dr. Death, in America is a form of active euthanasia. In 1990, Dr. Kevorkian, a retired Michigan pathologist, constructed

a device that enabled patients to commit suicide by pressing a button that would cause a lethal injection to be administered to the patient. His 'suicide machine' was first used to end the life of a 54-year-old woman suffering from Alzheimer's disease. He went on to assist more than 130 suicides. Although PAS is illegal in the US except for the state of Oregon, Dr. Kevorkian has never been able to be convicted of his action. But in November 1998, Dr. Kevorkian went on the national television to show how he performed the assisted suicide. He injected a lethal injection to his patient Thomas Youk. Mr. Youk, 52, who was suffering from advanced Lou Gehrig's disease. Lou Gehrig's disease, also known as amyotrophic lateral sclerosis (ALS), is a rare genetic nervous disorder. However, three days after the show was televised, Dr. Kevorkian was charged with first degree murder (TIME Magazine, December 7, 1998, Volume 152, No. 23). He was later found guilty of second-degree murder and spent eight years in prison.

PAS has always been a prime issue in the debate on the right to die. Some forms of active euthanasia are legally permitted in The Netherlands, Belgium, Luxembourg, Switzerland and the U.S. States of Oregon and Washington. In 1973, the Royal Dutch Medical Association approved these guidelines for PAS: the killing must be done by a physician; a second physician must concur; death must be requested by the patient while competent; the request must be free of doubt, well-documented and repeated; the request must not have been coerced; the patient's condition must be intolerable; and, there is no way to improve the patient's lot.

The American Medical Association takes a very different approach on PAS. Although active euthanasia is forbidden, passive euthanasia appears to be allowed. The practice of allowing patients to die by not treating them, endorsed by thinkers as early as Socrates, is an inescapable part of modern medicine. Today more than 80% of people die in hospitals, and advances in medical technology have made it possible to keep almost anyone alive indefinitely, even after they have no thought or feeling or hope of recovery. The maintenance of life by artificial means in such cases is deemed pointless, as the

hospitals would quickly be filled with living corpses, while more deserving patients could find no beds. Thus many would agree that it is morally acceptable to cease treatment and let such patients die (Beauchamp, 1993).

Modern Islamic *fatawa* do not differentiate between the various means of mercy killing. Muslim jurists consider all forms of euthanasia as murder. Since, according to Islam, the human body is not owned by anyone except Allah, then no one is free to do as he or she likes, what more to kill it. Thus the mercy killing of a terminally sick patient is forbidden in Islamic law.

Islamic law has always spoken of in fatalistic term, that is, when death happens it should be accepted bravely with no complaint, no protest and no doubts. Similarly, if an incurable disease continued for a long time, it should be viewed as an expression of Allah's will. Those inflicted with a chronic or debilitating disease must remember that only a few selected subject of Allah are chosen to undergo the test of suffering. Consolation should be sought in the knowledge that even prophets, jurists and righteous people are tested with the pain and agony of diseases. On this score, the Prophet Muhammad (pbuh) said: "No fatigue, nor disease, nor sorrow, nor sadness, nor hurt, nor distress befalls a Muslim, even if it were the prick he received from a thorn, but Allah makes up some of his sin for that" (cited in Kasule, 1999). Patience, therefore, is one of the highest virtues a Muslim may take pride in.

Medieval Islamic sources report that cases of mercy killing were more often performed by a Muslim upon himself rather than by others. These were mainly aimed at relieving one of intolerable pain. Examples quoted were of men wounded in battles and bleeding to death who chose to terminate their ordeals by stabbing themselves. Bukhari reported Junub ibn Abdullah relating the Prophet Muhammad (pbuh) as saying: "A wounded man killed himself prematurely, that is, before his actual death came. Upon this Allah ordained; 'O My creature, you gave your life too soon. I have made your entry into Heaven unlawful' " (Hassan, 1988). Similarly,

a person who assists in the killing of a human being, even with a single word, invites the displeasure of Allah.

In recent cases of mercy killing, the medical personnel is sometimes asked to terminate life by their patients. The Islamic prescription requires that a Muslim doctor and nurse strive to maintain, and not destroy, the life of the sick. When he or she terminated life, it was as if medicine had been used in contradiction to the purpose it was created by Allah (Rispler-Chaim, 1993).

Brain death

Among Muslim religious scholars, the subject of brain-death was discussed for the first time at the 2nd International Conference of Islamic Jurists (ICIJ) in Jeddah in 1985. However, no decree was passed except for calls for further studies on the subject to be carried out. At the 3rd ICIJ in Amman in 1986, brain-death was accepted as death. The resolution reads; "A person is pronounced dead and consequently, all dispositions of the Islamic law in case of death apply if one of the two following conditions has been established (Albar, 1996).

1. There is total cessation of cardiac and respiratory functions, and doctors have ruled that such cessation is irreversible.
2. There is total cessation of all cerebral functions and ruled by experienced specialised doctors that such cessation is irreversible and the brain has started to disintegrate.

In this case, it is permissible to take the person off resuscitation apparatus, even if the function of some organs e.g. heart, are still artificially maintained."

In Malaysia, the medical fraternity has been practising the concept of brain-death since the 1970s, but mostly limited to the specialists. At the 1st Conference of the Fatwa Committee on Religious Matters between 23rd and 24th June 1970, the medical procedure of heart and cornea transplant was accepted. This

indirectly signified the religious acceptance of brain-death as heart for transplant could only be obtained from brain-dead cadavers. Later in 1989, the National Fatwa Council adopted brain-death as the criterion for death (Jusoh, 1998).

PHARMACOETHICS

Malaysia upholds the principles of health as a fundamental human right and a shared responsibility of four entities: the individual, the government, the health profession and the community. As a commitment to social justice, the government advocates health as a social responsibility and a public health-care service that is made available to everyone, with equity of access, both in geographical and cost terms. It aims for a system of health delivery and financing which will ensure universal coverage, as well as promoting cost-sharing, cost containment and cost effectiveness (Malaysia's Vision 2020). The healthcare system in Malaysia involves many different agencies and organisations which may be directly or indirectly related to health. The Ministry of Health (MOH) as the government's lead agency in health plays an important role in providing, planning, organising and regulating the nation's health care.

The pharmaceutical sector 'medicine chain' involves many different steps including registration of medicines, selection of essential medicines, procurement, inspection of manufacturers and distribution and control of drug promotion (Table 2). Decisions have to be made at each level to ensure that the process produces maximum impact and is free from coercion and corrupt practice. We refer to this as the 'critical decision point'.

Each function has different objectives. For registration, the Drug Control Authority (DCA) reviews and approves applications for drugs to be registered and marketed in the country. The market approval of pharmaceutical products is usually granted on the basis of efficacy, safety and quality. The selection of essential drugs defines government priorities for medicine supply in the public sector. An

Table 2: 'Critical Decision Points' of the Pharmaceutical Sector 'Medicine chain' and their Related Parameters

Critical Decision Points	Registrations	Control of medicine promotion	Inspection of manufacturers and distributors	Selection	Procurement	Distribution
Related documentations, references, committees or activities	Efficacy Labeling Marketing Use Warnings Full registration Re-evaluation of older drugs	Provision in medicine legislations / regulations How comprehensive is the provision Mechanism on promotion and advertising Committee responsible for monitoring Written SOP guiding for drug promotion and advertising	GMPs Quality Assurance Master batch and laboratory control records Production and in process controls Track complaints	Determine budget Assess morbidity profile Determine drug needs to fit morbidity profile Cost/benefit analysis of drugs Consistency with WHO criteria	Determine model of supply/ distribution Reconcile needs and resources Develop criteria for tender Issue tender Evaluate bids Award supplier Determine contract terms Monitor order Make payment Quality assurance	Received and check drugs with order Ensure appropriate transportation and delivery to health facilities, appropriate storage Good inventory control Demand monitoring

effective procurement process ensures availability of the right drug in the right quantity, at reasonable prices, and of standard quality. Distributions must ensure that drugs are allocated, transported and stored appropriately before they are dispensed to patients. Inspection is an important area of drug regulatory system whereby staff of the regulatory authority, National Pharmaceutical Control Bureau (NPCB), may enter premises where drugs are manufactured, stored and distributed to ensure that processes are carried out in accordance with norms and standards, as well as being in line with legislation and regulation.

Control of drug promotion by Medicine Advertisement Board of Malaysia will ensure that promotional activities provide accurate information and that material benefit will not be offered to influence the practices of health professionals. The Medicine Advertisements Board is empowered by law to set policies and guidelines for all the advertisements related to medicines, appliances, remedies and skill and services that have medical and/or health claims. The objective of the guidelines is to ensure responsible advertising in promoting the sale of drugs, appliances, remedies, skills and services that have medical and health claims. To ensure access to good quality drugs, these core functions in the system where, the structures and processes are involved, must work optimally and free of corrupt practice.

In pharmacy practice, ethical dilemmas are inevitable as the role of pharmacists is expanding. Pharmacists now accept roles that are more intercessional, increase the number and enhance the intensity of their services, encounter territorial disputes with other health care providers and face increased consumer demands and expectations. Pharmacists are also faced with the ethical implications of increased integration into the health care system. Many are involved in the registration of products, sit on drug selection committees, manage procurement units and inspect manufacturing facilities.

Being a profession governed by an Act of Parliament, a pharmacist is expected to discharge his or her duties in an ethical manner. Instances where the pharmacist's ethics may be called into

question include providing drug information for questionable uses, distributing soon-to-expire medications and using drugs for non-approved indications.

What are the benefits of having a set of ethical practice? Firstly, a code of practice makes the decision-making process more efficient. Secondly, individual pharmacists may constantly be guided in their professional behaviour. Thirdly, professional ethics set up a standard pattern of behaviour which clients come to expect from members of the profession (ACA, 1995). On top of this, pharmacists in the public sector are required to observe the ethical principles stipulated in the National Integrity Plan issued by the Institute of Integrity Malaysia in 2004.

Between 2005 and 2008, we collaborated with the Ministry of Health, to conduct a multi-country study to assess the level of vulnerability to corruption at the various critical decision points of the pharmaceutical system. Interview surveys were conducted on respondents who were referred to as 'Key Informant (KI)'. KIs were recruited from public officials working at the Ministry, health professionals, pharmacists, pharmaceutical industry representatives and consumer group advocates.

The survey questionnaire used was an instrument developed by the World Health Organisation (WHO). The questionnaire consisted of several statements and sub-statements pertaining to the knowledge of KIs on the mechanisms that support decision making at the various points in the pharmaceutical system. This knowledge must be supported by the existence of a publicly available document. Each statement and sub-statement had been formulated to require a binary answer (yes/no). Each 'yes' was given a one, and 'no' a zero. If the KI did not know the answer, there was a option of assigning 'D.K' (Don't Know). The total of 'D.K' answers were subtracted from the total of the sub-statements available for each indicator, which would give the total of valid answers. The total 'yes' answers were counted and divided by the total of valid answers. The final rating

for the indicator was the total of 'yes' responses divided by the total number of valid answer (Table 3). A value of 'one' represented low vulnerability to corruption (must be supported by the existence of a publicly available document) and a value of zero represented high vulnerability to corruption.

Table 3: A Statement and Sub-Statements to Measure Key Informants' Knowledge on Procedures Related to Drug Registration by the Drug Control Authority

	No	Yes	D.K.
Written procedures	0	①	
Publicly accessible	0	①	
Describe the process to follow in submitting an application	0	①	
Mention timeframe for processing	①	1	
Mention fees	0	①	
Mention data to be submitted	0	1	✓
Mention criteria for registration	0	1	✓
Total			

The scoring for the indicators is then calculated as follows:

Total yes	4
Total valid answers	5
Scoring (total yes/total valid answers)	0.8

A 10-point rating system was used to indicate the degrees of vulnerability to corruption (Table 4)

Table 4: A 10-point Rating System on Vulnerability to Corruption

0-2.0	2.1-4.0	4.1-6.0	6.1-8.0	8.1-10.0
Extremely Vulnerable	Very Vulnerable	Moderately Vulnerable	Marginally Vulnerable	Minimally Vulnerable

The summary of results for quantitative analysis that represents the level of vulnerability to corruption is shown in Table 5.

Table 5: Summary of Results for Quantitative Analysis of Vulnerability to Corruption of the Pharmaceutical Sector in Malaysia

Critical decision point	Average based on ten point scale	Vulnerability to corruption
Registration	5.9	moderate
Promotion	6.5	marginal
Inspection	6.0	marginal
Selection	4.6	moderate
Procurement	5.6	moderate
Distribution	8.4	minimal
Overall rating	6.2	marginal

For the sake of comparison, the annual Transparency Index compiled by Transparency International indicates the index of economic freedom in Malaysia is to hover just above the score of 5, making Malaysia to be classified as a 'mostly free' country.

Another study on pharmacoethics looked at the conflict between professionalism and commercial interest among pharmacists in community practice in Malaysia and the United States of America. This is in view of reports of certain unethical behaviour of community pharmacists that include selling group B poisons without a valid prescription, selling psychotropics without recording in the proper Book, and selling unregistered medicines in a registered medicines container. This study aimed to primarily devise an instrument to study ethical practices among community pharmacists based on the four articles in the document of Code of Conduct for the Pharmacists and Bodies Corporate published by the Malaysian Pharmaceutical Society and the Pharmacy Board of Malaysia. The other objective was to establish the prevalence and type of unethical behaviour among the community pharmacists in both countries.

The questionnaires were scored on a five point Likert-scale, and after being validate were grouped under four pharmacoethics

dimensions namely: *Business Practice*, *Ethical Practice*, *Professional Practice* and *Personal Attitude*. Then, the differences among the means of these four pharmacoethics dimensions were tested. Table 6 shows that there are significant differences of means of the Ethical Practice and Personal Attitude dimensions ($p < 0.05$).

Table 6: Comparison of Means of Four Pharmacoethics Dimensions of Community Pharmacists in Malaysia and the USA (* $p < 0.05$)

Pharmacoethics dimensions	Nationality	Number of respondents	Mean rank	Sum of ranks
Mean of Business Practice	Malaysia	266	189.00	50274.00
	USA	120	203.48	24417.00
	Total	386		
Mean of Ethical Practice	Malaysia	266	169.58	45108.50
	USA	120	246.52*	29582.50
	Total	386		
Mean of Professional Practice	Malaysia	266	189.28	50348.00
	USA	120	202.86	24343.00
	Total	386		
Mean of Personal Attitude	Malaysia	266	170.65	45292.50
	USA	120	244.15*	29298.50
	Total	386		

From this particular study, preliminary data seem to indicate that the community pharmacists in the USA are more ethical than those in Malaysia in two of the pharmacoethics dimensions. This appears in line with the Gallup polls findings in 2008 where the pharmacists in the USA were rated second most honest and ethical at 70% of those surveyed. They can be considered very highly on honesty and ethics, losing only to nurses (84%).

CONCLUSION

The debate on human cloning may be purely academic as there appears to be little possibility that the procedure would be legalised in the near future. However, it is vital to revisit the subject of cloning as new knowledge is being churned out. More related data are being made available and new applications are being proposed. Through therapeutic cloning, further studies on debilitating diseases like Alzheimer's and motor neuron disease are indeed possible. To allow for the possibility of maximising the benefits drawn from the technique, scientists should be given the widest scope possible to conduct research on cloning on conditions that ethics or bioethics be used as the guiding principle. This is to ensure that rationality prevails in the quest for scientific discovery. Islamic courts have not come up with a fast rule on cloning. But they are certainly going to be kept busy in the twenty-first century. Hopefully, they would be guided by the reminder of the Prophet Muhammad (pbuh) that mankind would, if they wished, become the master of worldly matters. Nevertheless, the knowledge that they master should be used solely for the good of fellow being and not otherwise.

It is argued that if bioethics were about finding the true solutions to difficult problems, then secular bioethics would not be able to do justice to all as it is devoid of the transcendental influence of God. This is where religious bioethics would have to be roped in, to provide that added confidence of ensuring that we are acting along the true path of the Almighty. However, despite the seemingly different emphases of secular and religious bioethics, both are actually in line with man's virtues and expectations, regardless of his religious convictions or belief systems.

Rasmussen (1999) sees that the contribution by religious communities to bioethics is three fold. Other than being international institutions, they are also the grass-roots of moral deliberation and formation on matters of extended rights. As such, in that role, they can be advocates in international policy-making as well as local,

regional and national ones. Religious communities are perhaps, above all, shapers and keepers of overarching meaning and value of life. Their duties transcend across ages and generations through ritual, instruction, and concrete practice.

Indeed men and women of faith should take cognisance of Hans Küng's observation that the world's religions are all grounded in ethical insights that deserve one's attention and can justify one's hope (Küng, 1996). The theologian has also called for reconciliation between 'believers' and the 'unbelievers' of whom a certain segment of the scientific community included. Scientists in turn can take heed of Potter's proposition that as individuals, they can proceed according to the evolving bioethics conditioned by a combination of a personal humility and a proud display of professional competence (Potter, 1994). Naturally, to move effectively toward forging a meaningful dialogue between secular science and organised religion, traditionally separated by a vast gap of misunderstanding, mistrust and miscommunication, is a daunting task indeed. However, surely there must be hope.

Today, bioethics (incorporating medical ethics and pharmacoethics) is a full-fledged subject matter with a number of courses offered by international professional societies and universities throughout the world. It looks like bioethics will become even more important in the future when most probably secular bioethics may find some commonalities with religious bioethics. In any case, due to the increasing complexity of bioethical matters, religious principles may certainly be called on to help resolve certain issues. Hence, by referring to the Shariah or Islamic law, *fatawa* on ethical issues like therapeutic cloning, organ donation and transplant, and artificial insemination have been widely accepted.

REFERENCES

- Abdul Rauf, M. (1989) Marriage in Islam. Pustaka Antara, Kuala Lumpur.
- Albar, M.A. (1996) Islamic ethics of organ transplantation and brain death. Saudi Journal of Kidney Diseases and Transplantation, 7:109-114.
- Ali, A.Y. (1991) The Meaning of the Holy Quran, American Trust Publications Amana Corporation Maryland, USA.
- ACA - American Counseling Association (2005). ACA Code of Ethics. Alexandria, VA, USA.
- Beardsley, T. (1998) Where science and religion meet. Scientific American, February, pp. 18-19.
- Beauchamp, T.L. (1993) Suicide. In: Matters of Life and Death. Regan, T. (ed.) McGraw-Hill, Inc., USA. pp. 69-117.
- Beach, R. (1996) The responsible conduct of research. VCH, Weinheim, Germany.
- Bravo, E. (1977) The biosafety: a perspective of the third world. Paper presented at: Konferenz "Bio- und Gentechnologie - optionen für die", Bonn, den 29. April.
- Brock, D.W. (1993) Life and Death - philosophical essays in biomedical ethics, Cambridge University Press, p. 145.
- Brüstle, O., Jones, K.N., Learish, R.D., Karram, K., Choudhary, K., Wiestler, O.D., Duncan, I. & McKay, R.D.G. (1999) Embryonic stem cell-derived glial precursors: a source of myelinating transplants. Science 285: 754-756.
- Campbell, K.H.S., McWhir, J., Ritchie, W.A. & Wilmut, I. (1997) Sheep cloned by nuclear transfer from a cultured cell line. Nature 385: 810-813.
- Cook -Deegan, R. (1995) The Gene Wars. W.W. Norton & Co., New York.

- Ebrahim, A.F.M. (1988) Biomedical issues - Islamic perspective. A.S. Noordeen, Kuala Lumpur.
- Elmer - Dewitt, P.(1993) Cloning: Where do we draw the line? *TIME*, November 8, pp. 28 – 34.
- Engelhardt, Jr., H.T. (2000) *The Foundations of Christian Bioethics*. Swets & Zeitlinger Publisher, Downingtown, PA, USA.
- Fletcher, J. (1974) *The ethics of genetic control: ending reproductive roulette*. Garden City, New York. Anchor Press/Doubleday.
- Geary, J. (1998) The undiscovered country, *TIME* Special Issue, The New Age of Discovery, January 1998, pp. 96.
- Guyton, A.C. (1991) *Textbook of medical physiology*, (8th. ed.) W.B. Saunders Company, USA, p.78.
- Haddad A. (1995) Ethical problems in pharmacy practices: a survey of difficulty and incidence. *American Journal of Pharmacy Education* 55:1-6.
- Hassan, A. (1988) *Sunan Abu Dawud, Kitab al-Janaiz*, Volume 2, Sh. Mohammed Ashraf, Lahore. p 884.
- Hathout, H. (1995) *Reading the Muslim Mind*. American Trust Publication, Indiana, US.
- Herlihy, J. (1990) *In Search of the truth*. Dewan Pustaka Islam, Kuala Lumpur, pp. 1-30.
- Holden, C. (1999) Subjecting belief to the scientific method. *Science* 284:1257-1259.
- Jonas, H. (1993) *The imperative of responsibility: in search of an ethic for the technological age*. University of Chicago Press, USA.
- Jusoh, M.R. (1998) *Mati otak - Perspektif doktor Islam, Brain-death - A Muslim Doctor's perspective*, In: Ibrahim, I. (ed.) *Islam dan pemindahan organ, Islam and organ transplantation*, Institute of Islamic Understanding Malaysia (IKIM) Kuala Lumpur, 13-40.

- Kaiser, J. (1999) Stem cells as potential nerve therapy. *Science* 285:649-650.
- Kass, L.R. (1972) Making babies - the new biology and the 'old' morality. *Public Interest* 26: 18-26.
- Kasule, O. H. (1999) Citing narration by Abu Sa'id Al-Khuduri and Abu Huraira, in *Current medical services - an Islamic perspective*. In: *Konsep dan Operasi Perubatan Islam (The Concept and Operation of Islamic Medical Practice)*, Yang, A.B. and Majeed, A.B.A. (eds.) Institute of Islamic Understanding Malaysia, Kuala Lumpur.
- Khor, M. (1997) Sheep cloning sparks ethics debate. *The STAR*, Monday March 24.
- Khor, M. (1997) Ban on human cloning needed. *The STAR*, Monday, March 31.
- Koenig, R. (1999) European researchers grapple with animal rights. *Science* 284: 1604-1606.
- Krauthammer, C. (1987) The ethics of human manufacture. *The New Republic* 4:17-18.
- Krimsky, S. (1998) All aboard the biotech express. *Nature* 393: 31-32.
- Kung, H. (1996) *Global Responsibility – In Search of a New World Ethic*. Continuum, New York, pp. 55-64.
- Madkour I. B. (ca. 1912) *The Study of Islamic Philosophy*, translated from Persian by Shahyar Sa'adat Vol. 1, No. 1 (Muharram 1404 AH).
- Majeed, A.B.A. (2002) *Bioethics – Ethics in the Biotechnology Century*. (ed.) Institute of Islamic Understanding Malaysia, Kuala Lumpur.
- Majeed, A.B.A. (2003) *Research and development in biological science*. In: *New Knowledge – Research and Development in the Muslim world*. In: Majeed, A.B.A. & S.M.S.S.M. Salleh (eds.), Institute of Islamic Understanding Malaysia, Kuala Lumpur.

- Majeed, A.B.A. (2004) Globalisation and the erosion or consolidation of religious belief? – a 'bioethics' perspective. In: Malaysia and Globalisation – Issues and Challenges in the 21st Century. Salleh, K.O. & Kanthasamy, N., University of Malaya, Kuala Lumpur.
- Majeed, A.B.A. (2004) Bioethics – Attack of the clones? In: Issues in Medical Law and Ethics. Kassim, P.N.J. & Abdullah, A.H.M. International Islamic University, Kuala Lumpur.
- Majeed, A.B.A. (2008) Amalan etika perubatan dan farmasi. UPENA, Universiti Teknologi Mara, Malaysia.
- Maududi, A.A. (1986) The Islamic way of life, Ahmad, K & Murad, K. (eds.) The Islamic Foundation, United Kingdom, pp. 9-20.
- Nash, J.M. (1997) The Age of Cloning. TIME, March 10, pp. 30 – 34.
- Nasr, S.H. (1984) Science and Civilization in Islam Dewan Pustaka Fajar, Shah Alam.
- Nasr, S.H. (1994) A Young Muslims's guide to the Modern World. Mekar Publishers, Petaling Jaya.
- Parvaiz, M.A. (1998) Genetic engineering, cloning and al-mizan (the balance) Paper presented at: Islam and Ecology Seminar, May 7-10, Center for the Study of World Religions, Harvard University, Cambridge, USA.
- Pennisi, E. & Vogel, G. (2000) Clones: a hard act to follow. Science 288: 1722-1727.
- Peters, T. (1997) Cloning shock: a theological reaction. CTNS (Berkeley, US) Bulletin 17: 1-9.
- Potter, V.R. (1970) Bioethics: the science of survival. Perspectives in Biology and Medicine 14: 127-153.
- Potter, V.R. (1975) Humility and responsibility – a bioethics for oncologists, Presidential Address, Cancer Research 35: 2297-3306.

- Potter, V.R. (1988) *Global Bioethics: Building on the Leopold Legacy*, Michigan State University Press, East Lansing, Michigan USA, p. 74.
- Potter, V.R. (1994) Science, religion must share quest for global survival. *The Scientist* 8:12.
- Rahman, F. (1989) *Major themes of the Qur'an Bibliotheca Islamica*, Minneapolis.
- Rahman, F. (1993) Health and medicine in the Islamic tradition, S. Abdul Majeed & Co., Kuala Lumpur, pp. 125-129.
- Rasmussen, L. (1999) Human Environmental Rights and/or Biotic Rights. In Gustafson, C. and Juviler, P. (eds.) *Religion and Human Rights – Competing Claims*. M. E. Sharpe, New York, pp. 36-52.
- Reich W.T. (1999) The “Wider View”: André Hellegers’s Passionate, Integrating Intellect and the Creation of Bioethics. *Kennedy Institute of Ethics Journal* 9: 25-51.
- Rifkin, J. (1998) *The biotech century: harnessing the gene and remaking the world*.
- Rispler-Chaim, V. (1993) *Islamic medical ethics in the twentieth century*. E.J. Brill, Leiden. pp. 94-99.
- Shapiro, H. T. (1999) Ethical dilemmas and stem cell research. *Science*: 285: 2065.
- Smolan, R. Moffitt, P. & Naythons, M. (1990) *The Power to Heal - ancient arts and modern medicine*, Prentice Hall Press, New York, p. 154.
- Solter, D. (1998) Dolly is a clone – and no longer alone. *Nature* 394: 315-316.
- Stanley, M. (1981) *The Technological Conscience: Survival and Dignity in an Age of Expertise*. University of Chicago Press, USA.

- Szajkowski, B. (1988) Muslim people in Eastern Europe: ethnicity and religion. *Journal of Institute of Muslim Minority Affairs* 9: 103-118.
- Twycross, R. (1992) Coping with death. In: Duin, N. & Sutcliffe, J. (eds.) *A History of Medicine*, Simon and Schuster, London, pp. 244-245.
- Vlavianos-Aarvanitis, A. (2000) Bio-environment - bio-culture: the bio-political context of pluriculturalism. In: *The challenges of pluriculturalism in Europe*. Baier-Allen, S. & Cucic, L. (eds.), Nomos Verlagsgesellschaft, Germany.
- Wakayama, T., Perry, A.C.F., Zuccotti, M., Johnson, K.R. and Yanagimachi, R. (1998) Full-term development of mice from enucleated oocytes injected with cumulus cell nuclei. *Nature* 394:369-374.
- Wilmot, I. (1998) Cloning in medicine. *Scientific American*, December, pp. 30-35.
- Zitner, A. (2000) Embryo stem cell work could get public funding, *Los Angeles Times*, August 13.

Index

A

Euthanasia 1, 39, 41-43
 active 9, 41, 42
alcohol 23
Alzheimer's disease 42
amyotrophic lateral sclerosis 42
ethics 1, 8, 16-18, 20-22, 25, 26, 33,
 40, 47, 48, 52, 53
 applied 1, 17
Animal Rights Movement 16
anti-rejection drugs 24, 16
anti-vivisectionist 20
artificial reproductive technology
 5, 7
asexual 12, 26
Averroes 21
Avicenna 21

B

bioethicists 20
blastocyst 8, 34
brain 16, 24, 34, 36, 37, 44
brain-death 24, 44, 45

C

cadaveric 24
cancer 19
Christian bioethics 20, 21

ethics 1, 8, 16-18, 20-22, 25, 26, 33,
 40, 47, 48, 52, 53
 applied 1, 17
 clinical 19
communitarianism 18
conception 5, 10, 12, 34
consequentialist 17
cornea transplant 22, 44
Cryonics 37

D

deontological 17
deoxyribonucleic acid (DNA) 6
descriptive ethics 17
diabetes 32, 8
Dolly 4, 7, 8, 10, 13, 15, 33,
Dr. Death 35, 41
drug 8, 23, 45, 47, 48
 distribution 40, 50
 inspection 45, 47, 50

promotion 45, 47, 50
procurement 45, 47, 50
registration 45, 47, 50
selection 30, 45, 47, 50

E

ecoethics 19
ecology 30
efficacy 45
electroencephalographic (EEG)
 waves 36
embryo 3, 6, 7, 9, 10, 12, 13, 16,
 33-35
enucleated egg 10, 13
ethics, medical 16
ethics, normative 17, 19
ethicists 4, 20, 27
euthanasia 1, 39, 41-43
euthanasia 1, 39, 41-43
 passive 10, 41, 42
Eve 12

F

fertilisation 8, 9, 19, 32-34
fertility 4, 6, 9, 13, 20, 29, 30
fetus 3

G

genetically-engineered crops 30
glucose 32

H

Harvard criteria 37
Hippocrates Oath 20
Huntington's diseases 30

I

immunisation 23, 24
indicator 48, 49
insemination 2, 5, 7, 29, 30, 54
insulin 23, 32
in-vitro fertilization 7
Islamic civilisation 21
Islamic Law 2, 21, 24, 29, 41, 43,
 44, 54

J

jihad 41

L

Lou Gehrig's disease 42

M

mammary gland 3
mercy killing. (see Euthanasia) 39,
 41, 43, 44
meta-ethics or theoretical ethics 17

O

organ transplant 24, 25

P

pain 38, 40, 43,
paraplegics 16
Parkinson's disease 16
parthenogenesis 7
Physician-Assisted Suicide 35, 41
porcine 23
positive disvalues 40
positive values 40

prescription 2, 44, 51
preventive medicine 24
primum non nocere 25
promotive medicine 24

Prophet Muhammad 21, 22, 24, 25,
29, 35, 39, 43, 52

U
utilitarianism 17

V
vaccines 22-24
ventilator 36, 37

Q
quality 30, 45, 47

R
red blood cells 32
relationalism 18
reproduction 4, 5, 29, 31
reproductive cloning 27, 28
rigor mortis 37

S
safety 45
science fiction 12
selection 30, 45, 47, 50
semen 5, 7, 28, 30
sickle-cell anemia 8
Somatic Cell Nuclear Transfer
(SCNT) 7, 10, 32, 34
suicide 35, 39-42, 55
suicide machine 42
suicidologists 39
surrogate mother 7

T
technoethics 19
therapeutic cloning 2, 16, 27, 33,
52, 54

Biodata

Abu Bakar Abdul Majeed obtained a Bachelor of Pharmacy degree from Al-Zagazig University, Egypt, in 1983. After the completion of an internship programme at Hospital Kuala Lumpur in 1985, he was registered as a pharmacist with the Malaysian Pharmacy Board. In the same year he joined Universiti Sains Malaysia (USM) Penang and was awarded the Academic Staff Training Scheme Fellowship to pursue a PhD in Neurophysiology at Sheffield University, the United Kingdom. Immediately after obtaining the doctorate in March 1988, he began teaching at the School of Pharmacy, USM. Abu Bakar was awarded the International Brain Research Organisation (IBRO) Post-doctoral Fellowship at Japan's foremost brain research institution, the Laboratory for Neural Information Processing, RIKEN, near Tokyo in 1992. A year later, he returned to RIKEN as a visiting scientist for the sabbatical. At USM he also pursued, on a part-time basis, a Masters in Business Administration (MBA) programme and graduated in 1996.

In 1997, Abu Bakar joined the Institute of Islamic Understanding Malaysia (IKIM) as a Senior Fellow at the Centre for Economics, Social Science and Technology. He wrote fortnightly in the Saturday Forum column of the New Straits Times between 1997 and 2002. Abu Bakar was the founding Director, Consulting and Training Centre (PPLI), IKIM, which was set up in 2000. In the same year

he was awarded two fellowships. The first was to do research on 'Bioethics' at the Centre for European Integration (ZEI) in Bonn, Germany. The second was on 'Religion and Society' by the US State Department. He visited universities, think-tanks and research centres in Washington D.C., New York, Chicago, Raleigh and San Francisco.

In February 2002, Abu Bakar was appointed Professor, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) and on 1st September 2002 Dean of the Faculty. In January 2004, he was made Founding Chairman of Nexus of Science and Technology, comprising 12 faculties at UiTM, including medical, engineering and applied sciences. His current post is Assistant Vice-Chancellor, Research Management Institute, UiTM.

On the professional front, Abu Bakar was elected a Council Member of Malaysian Pharmaceutical Society in May 1995, its vice president 1997–1998 and Deputy President 2001. He was been given the urgent task to establish the Continuing Pharmacy Education programme in the country. The success of the project culminated in the formation of the Malaysian Academy of Pharmacy in 2002. He was appointed Principal of the Academy in February 2004. Abu Bakar was also a member of the Pharmacy Board of Malaysia (2000–2003).

He has written, 'Making the Best of Both Worlds – volume 1: Faith and Science' and 'volume 2: Heaven and Earth', 'Ethical Practice in Medicine and Pharmacy' and 'Understanding Pharmacokinetic Models'. Among the books he edited are: 'Islam and Development in Asia', 'Islamic World and Europe – Some Issues', 'Bioethics – Ethics in the Biotechnology Century', 'The Concept and Operations of Islamic Medicine', 'Islam and Preventive Medicine', 'Islam and Multimedia', 'Enhancing the Understanding of Islam for the Media', and 'New Knowledge – R&D in the Islamic World'.

Abu Bakar is married to Balkhis Othman. They have two boys, Abdul Azeem and Abdul Azeez, and twin girls, Aisyah and Atikah. For leasure, Abu Bakar enjoys travelling, sports and photography.

Advances in biotechnology, pharmacy and medicine have generated ethical issues like human cloning, artificial reproductive technologies, genetic engineering, organ donation and transplant, stem cells research and euthanasia. The discipline of bioethics, which encompasses medical ethics and pharmacoeconomics, can be defined as the study of the rightness and wrongness of acts performed within the discipline of life science. However, simply adopting bioethics based on secular approach may not be ideal. Religious principles and prescriptions must be the foundation for discussing bioethical issues. Solutions that are based on the principles of the Shariah or Islamic law are more likely to be accepted.



University Publication Centre (UPENA)

PEMENANG
Anugerah Kualiti
Perdana Menteri
2008

