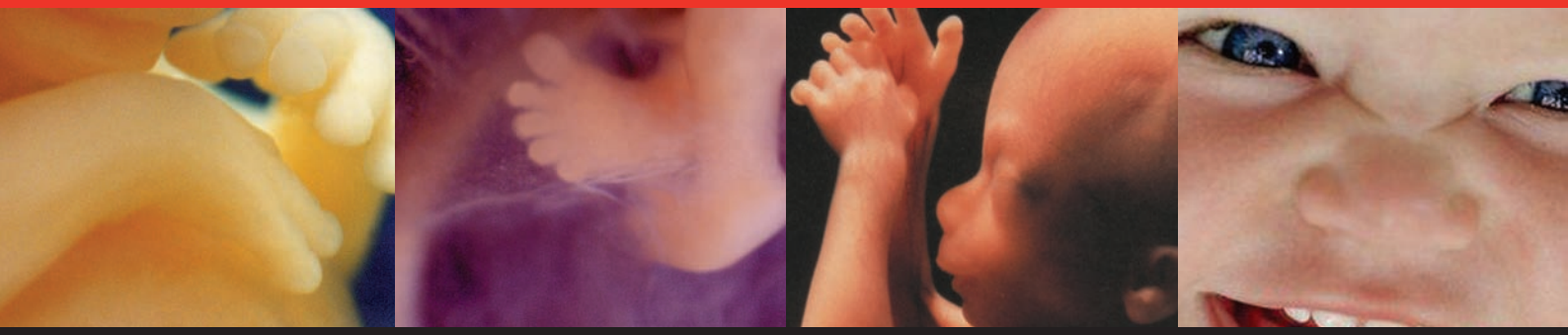

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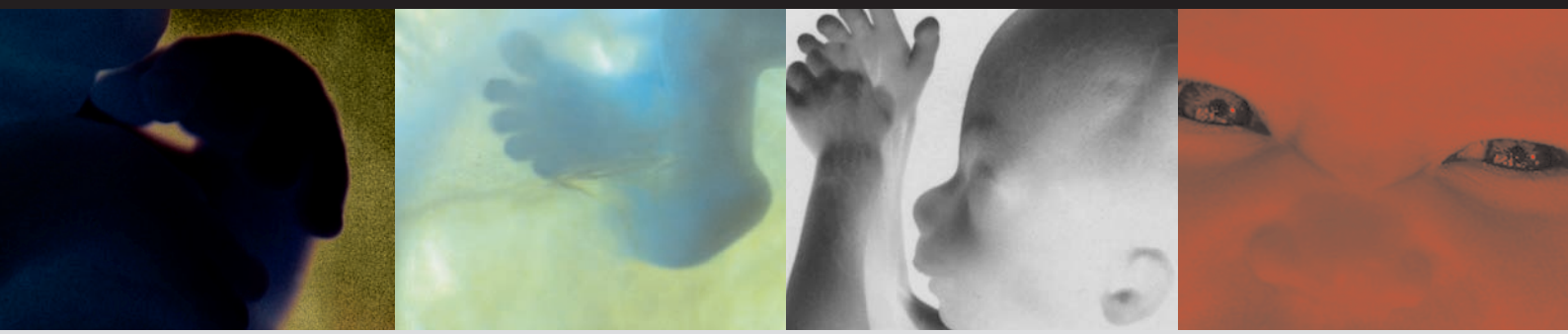

WHY HUMAN LIFE DESERVES OUR RESPECT

NO EXCEPTIONS - *Why Human Life Deserves Our Respect*

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"SCIENCE IS ORGANISED KNOWLEDGE. WISDOM IS ORGANISED LIFE."

Immanuel Kant

EOGHAN DE FAOITE & ADRIAN O'BOYLE

CONTENTS

INTRODUCTION

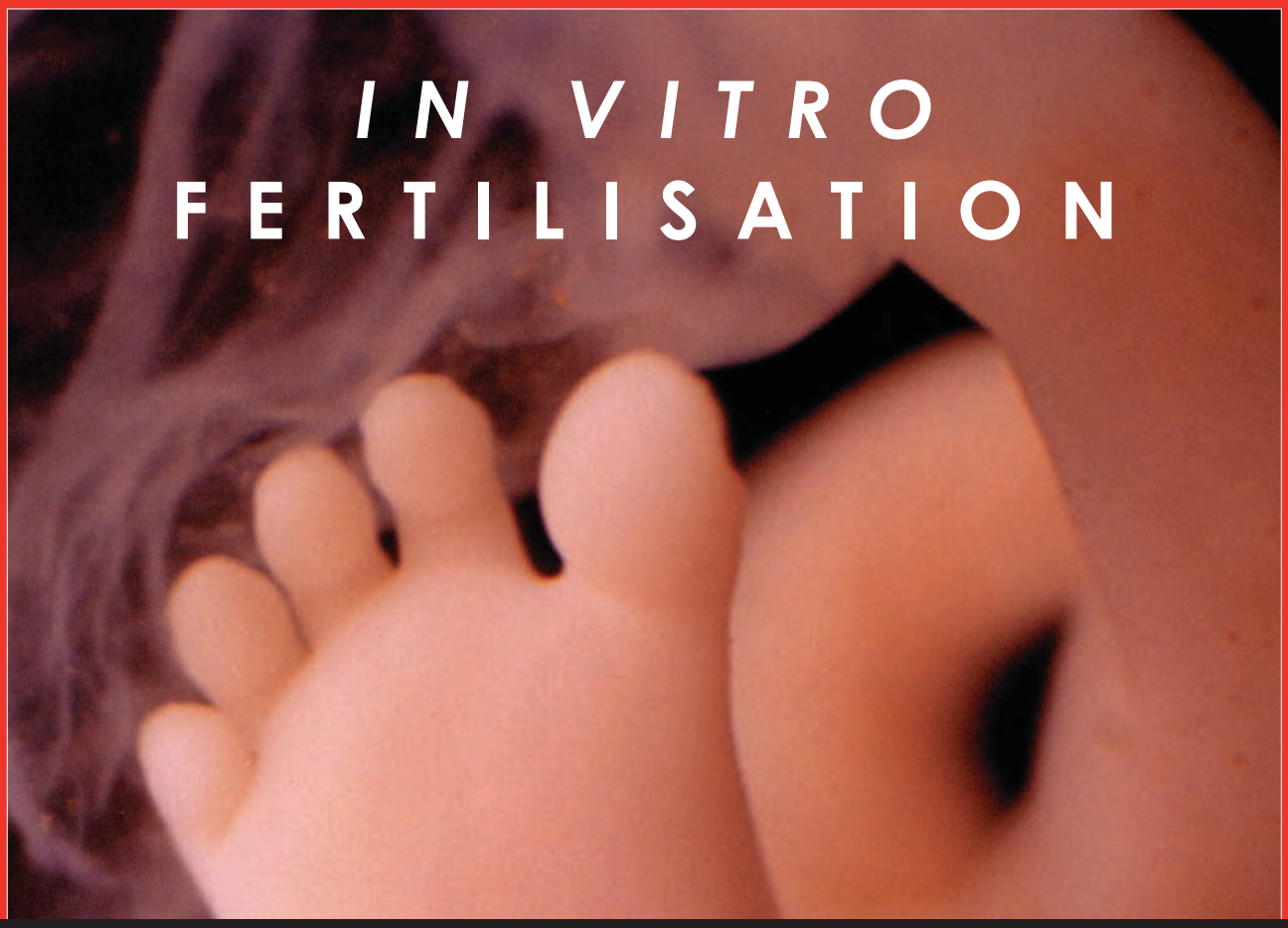
Our report deals with the future of humanity. It discusses the immense power of biotechnology and its ability to remake the very nature of the human person. We are entering a genetic age; an age that holds many confrontations, challenges and tests. We must be prepared to face them. A powerful alliance of government, business and science is propelling society into a new era in which human beings will have unprecedented control over many living things, including ourselves. Biotechnology is rapidly developing a God-like power to remake the biology of the human species. This power may transform society and, possibly, what it means to be human.

Our report explores the issues surrounding the advance of biotechnology and the impact it will have on human nature from the cellular level through to adulthood. Experiments involving the very building blocks of human life are already being carried out. Embryos have been produced that are part animal and part human; mice and pigs exist today that have human brain cells; unborn baby girls are being aborted at 7 and 8 months in order to take ova from their ovaries and use them to create new life.

Few issues today are as important, or as controversial, as those surrounding current developments in biotechnology. The decisions we make with regard to assisted reproduction, stem cell research, human cloning, genetic engineering and “designer babies” will shape our future and the future of our children. Procedures that were once thought of as fantastic or impossible are now routine. Science fiction is becoming science fact. Some developments in biotechnology are complex and will be explained in our report, whose purpose is firstly to inform, and secondly, to assist your participation in controlling these tremendously powerful emerging technologies.

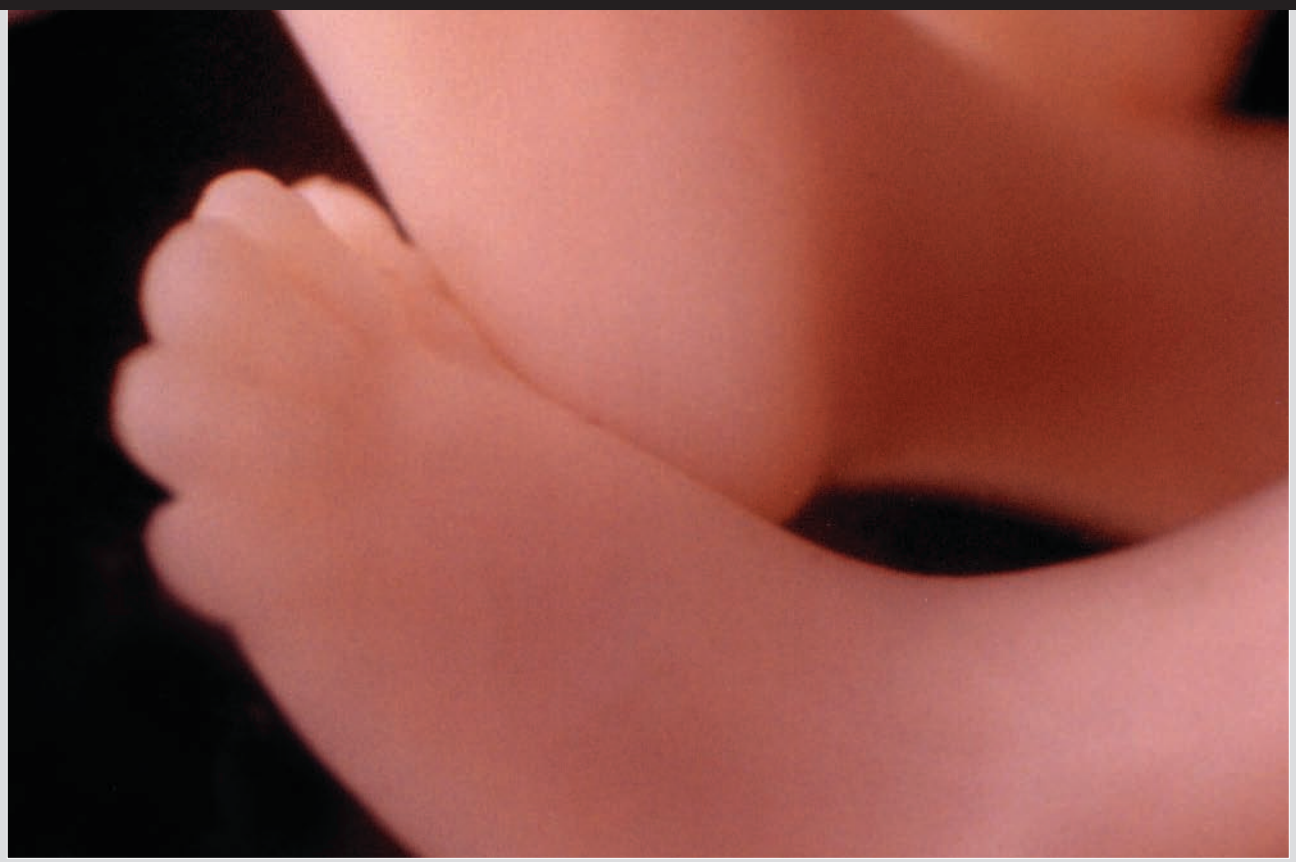
It is crucial that we understand where the world may be leading us and our children. The stakes are high. We must get it right.

IN VITRO FERTILISATION



"THE GOOD OF LIFE IS LIVING IN AGREEMENT WITH NATURE."

Zeno



WHY HUMAN LIFE DESERVES OUR RESPECT

Test-tube babies

Shortly before midnight on 25 July 1978, Louise Brown was born in a hospital near Manchester, England. Louise was the world's first baby born through an IVF procedure, or, using more popular terminology, she was the first "test-tube" baby.[1]

IVF, or *In Vitro* Fertilisation, has become widespread since then, and to date more than 1 million babies have been born as a result of this technology.[2] While the scientific world marvelled at their accomplishment in producing the first IVF baby, it often seems now as if they have opened Pandora's Box.

What is *In Vitro* Fertilisation?

In Vitro Fertilisation or IVF is actually a term used to describe four different procedures. They are;

- the production of ova
- the extraction of ova
- the fertilisation of ova and
- the transfer of the human embryo

It is not within the remit of our report to explain these four processes in detail. However, the most important points of every one will be described here. At first the woman is given a series of powerful fertility drugs that stimulate the development of ova in her ovaries. The development of these ova is then monitored, and when they reach a satisfactory size they are ready for extraction. Ova extraction is the most straightforward and accurate description for the next stage. The main method of extraction is done by inserting a hollow needle through an incision in the woman's body into the ovaries. Up to 20 ova can be produced by this stage and they are sucked out through the needle and are placed in a glass dish for observation.[3]

Spermatozoa are then collected and usually about 100,000 spermatozoa are added to every ovum in a petri dish. These dishes are then incubated and during this time the spermatozoon will attempt to fertilise the ovum. If successful, the result is a single-celled human embryo - the result of fertilisation. After another six hours a two-cell embryo exists; at twelve hours the cells have divided again; and after 14 - 20 hours there is an eight-cell embryo. At the two-, four- or eight-cell stage, the embryo is ready for transfer.[4] The final stage of IVF is called embryo transfer, and involves inserting through the cervix, a hollow tube containing the embryos and then flushing the embryos out into the uterus. Up to three embryos can be transferred during one cycle.[5] The woman must then wait to see if any of these embryonic human beings have managed to implant themselves into the lining of her uterus, just as happens in normal pregnancy.

IVF Success Rates

Although 1 million babies have been born using IVF worldwide, there continues to be much debate about the success rates of this, and other assisted human reproductive (AHR) technologies. When reviewing the success and failure rates of IVF it is important that we consider a number of factors that affect and influence these outcomes.

Published IVF success rates are often used to give couples seeking treatment a general indication as to their chances of giving birth. However, the fact remains that all statistical methods always assess data from populations that are sampled, averaged etc., and a patient is not a population. Every patient has a unique set of circumstances that defines her own specific likelihood of achieving a pregnancy, even at a highly experienced IVF facility. The key to making success rates look good is to control the population data used to extract statistics. This is relatively easy to do, and according to some experts it is done systematically at some IVF centres.[6]

The authors of an article on published IVF success rates that appeared in *NewScientist* (10 July 2002), suggest that league tables listing the success rates of IVF clinics are encouraging bad practices. Doctors told *NewScientist* that "the pressure to achieve a high ranking in the IVF success tables is driving clinics to select younger patients with a higher chance of getting pregnant, to implant more embryos than necessary, and even to recommend IVF to women who do not need it."[7]

When IVF success rates for a region, or for a specific clinic, are recorded and released, it is important to understand that this does not represent accurately a couple's chances of getting pregnant through IVF. In the 2005 report of the Irish Commission on Assisted Human Reproduction (CAHR), the authors cite

success rates for IVF of 25.1% per treatment cycle for the period between 1 April 2000 and 31 March 2001 for clinics in the UK. However, although this figure may be the national average in the UK, more than half of the clinics to which the CAHR refers had success rates of below 25.1%. Some of the fertility treatment centres have had rates as low as 10.5% per treatment cycle.[8]

Ethical Problems with IVF

From an ethical point of view an IVF treatment cycle can be regarded as completely successful only when an embryo is transferred into a mother's womb and it grows and develops into a healthy baby. Every human embryo represents a human life, and, even when one embryo is successfully implanted, the others formed in the IVF process are often lost or destroyed.

The national statistics from the UK, to which the CAHR refer, state that out of 22,116 embryo transfers, 5,615 implanted, giving a "success" rate of 25.4%. This then means that for every 100 embryos transferred from the petri dish to the mother's womb, only 25 are likely to see the light of day as born children and the other 75 will die. The number of successful implants decreases significantly to 14.7% for embryos transferred after being frozen. However, the real figure of embryos lost will in fact be much higher given that these figures only represent the number of embryos *transferred* and not the number of embryos *formed.*[9]

Creation and Destruction of Human Embryos

The UK Human Fertilisation and Embryology Authority, from which the CAHR received their IVF success rates, do not provide us with the total number of embryos formed through IVF. Evidence from Australian figures, however, shows a live-birth rate of embryos formed of about 4.2%. That means that for every 100 human embryos formed only 4 will result in born children.[10] The Australian figures give a more accurate picture of the survival of human embryos in the IVF process, since they compare the total of embryos formed with the number of children born, while the UK figures only compare the number of embryos transferred to the womb with the number of children born. In Canada, researchers at the Ottawa Research Health Institute have admitted that only 10-20% of human embryos formed by IVF survive to transfer and that the percentage of embryos who actually make it to birth is significantly lower.[11]

So what is done with the so-called excess human embryos formed and left over after IVF treatment? A huge ethical dilemma has arisen surrounding embryo freezing, storage and destruction. In any one IVF treatment cycle more than one embryo is formed, and these "spare" embryos, considered surplus to requirements, are either stored or destroyed. The ethical complexities surrounding this issue are so intricate that they necessitate their own chapter in our report. Suffice it to say at this point that an inherent contradiction exists in the mindset of IVF providers. On the one hand they claim to assist couples with infertility problems to conceive a much-desired child. Yet the embryo children of these couples are casually destroyed if they are "surplus to requirements".

In reality, IVF still remains a highly experimental procedure and, considering all the serious risks involved, it is extremely inefficient in terms of outcomes. It should be made absolutely clear that published national statistics on the outcome of IVF procedures do not accurately represent a person's chances of having a live birth following IVF. Also, any statistics published should include the number of human embryos formed through IVF so as we can be very clear on the amount of early human lives lost with every cycle.

Risks to the Child Born Through IVF/AHR

It has to be acknowledged that many thousands of healthy babies have been born through assisted reproductive technology. However, it also has to be acknowledged that serious doubts continue to be raised about the safety of this procedure in relation to women's health, and in relation to the effects on children who are conceived and born through this technology.

A major study in relation to IVF and its negative outcomes was undertaken by a team of researchers in Australia, a country where one in 20 people are now born through IVF.[12] This startling research found that IVF children are twice as likely to suffer from

birth defects as compared to children conceived in the conventional manner. Dr Carole Bower and colleagues studied the birth records of IVF children born in Western Australia. They adjusted the study for the obvious problems of multiple births and factors relating to the mother's age, yet they still found that there were twice as many birth defects in IVF children.[13] In response to Dr Bower's findings, Australian embryologist Dr Jeremy Thompson had the following to say: "The consumer basis for the industry has focused on having high pregnancy rates, getting people pregnant as quickly as they can. But it hasn't focused necessarily on the long-term outcomes."[14]

The birth defects associated with IVF include lower birth weight,[15] babies being born premature,[16] and an increased risk of the neurological condition, cerebral palsy, in the child.[17] In fact one such study found an 80% increased risk of cerebral palsy in children born as a result of IVF.[18] Birth weight is an important indicator of infant health and it has been suggested in research that babies born through IVF can be of significantly lower birth weight than regular babies.[19] Researchers at the Netherlands Leiden University found that, in some cases, the risk of a preterm birth was doubled for children conceived through IVF. The researchers concluded that "singletons from assisted conception are significantly disadvantaged."[20]

A range of urological disorders has also been associated with children born as a result of IVF, particularly in males.[21] Such complications of the urinary system can be a cause of great discomfort and embarrassment for a child. More seriously, IVF has also been associated with congenital heart defects, Down's Syndrome, club foot, and cleft palate.[22]

Retinoblastoma is a form of cancer of the eyes that occurs in childhood. An increased risk of developing retinoblastoma in children born through IVF has been suggested in research. One team of researchers in the Netherlands found that the relative risks for developing this cancer were "significantly raised" in children born through IVF as compared with children born naturally.[23]

It is not certain what there is about the IVF procedure which causes these defects in IVF children. Recent data suggests that chromosomal abnormalities can occur when injecting sperm into an ovum, resulting in birth defects.[24] Also, genetic abnormalities in the parent, perhaps linked to their own infertility, could also be responsible for defects in IVF children.[25]

Miscarriage and Still-Births for IVF Pregnancies

Tragically, the miscarriage rate, and perinatal death rate (still-births after 20 weeks and neonatal death after 28 days) also appear to be higher for children conceived through IVF.[26, 27] The authors of one review into the neo-natal outcome of children born after IVF, state that "a high rate of adverse outcome has been demonstrated in a large group of IVF pregnancies." They conclude, "all IVF pregnancies should be followed with great care, not because they are more precious but because they are exposed to an increased risk of complications."[28]

Experts in the field, at a meeting of the American Society for Reproductive Medicine, noted that IVF is suspected of causing infertility, and increasing the chances of cystic fibrosis and cancer.[29] Dr Larry Lipshultz of Baylor College of Medicine addressed the conference saying, "We have to ask ourselves, what are we doing? There is significant concern over the transmission of these abnormal paternal genes to the offspring."

The studies and research quoted in our report really only represent the tip of the iceberg regarding research that shows that IVF can have serious negative impacts on children. This is, however, an area which requires further research, and the authors of our report strongly recommend that a thorough investigation into the safety of AHR procedures is immediately undertaken.

Risks to the Mother from IVF Procedures

IVF has inherent risks for the woman receiving treatment and most of these dangers arise from the abnormal process of extracting ova from the woman's ovaries. Superovulation involves using drugs to stimulate a woman's ovaries in order for them to generate a larger than normal number of ova. This procedure is used to try to increase a woman's chances of conceiving a child through IVF by fertilising as many ova as she can produce.

Without superovulation, i.e. by using natural ovulation methods, the success rates for IVF would be between 0% and 4% per cycle.[30] For this reason ovarian stimulation is used as part of the IVF procedure in an attempt to increase its success rate. This, however, is not without consequences.

Ovarian Hyperstimulation Syndrome (OHSS) is one of the commonest complications of IVF, and it arises from the overstimulation of ovaries in superovulation. Most of the dangers for a woman availing of IVF treatment stem from OHSS; in fact, some women have died from this syndrome.

Fatalities Arising from IVF Procedures

One such woman was 32-year-old Mrs Jacqueline Rushton from Dublin who died, on 14 January 2003, from OHSS while receiving fertility treatment in the Rotunda Hospital, Dublin.[31] Dublin City Coroner Dr Brian Farrell found that Mrs Rushton died from a complication arising from OHSS. Unfortunately Mrs Rushton isn't the only casualty of IVF - the Center for Disease Control (CDC) in the US reported a death from intra-cranial haemorrhage (a type of stroke) in a woman following IVF-induced OHSS in 1996.[32] Cluroe *et al.* report of another death that occurred in New Zealand in 1995 resulting from an OHSS-triggered blood clot to the brain.[33]

Studies have also shown that the over-stimulation of ovaries in superovulation have caused non-fatal stroke,[34] heart attacks[35] and cases of thrombosis[36-39] (a life-threatening blood clot). In one such case, a blood clot caused by OHSS resulted in the necessary amputation of the woman's arm.[40] These are the physical aspects of the damage that IVF can cause in a woman. Countless women have testified to the psychological injuries that can occur. In one collection of experiences, a woman proclaims "there's nothing that can describe what you go through, the mental torture you put yourself through."[41] Anthony Dyson in his book, *The Ethics of IVF,* explains that "the vulnerability to stress, anxiety, disappointment, depression, pain, exhaustion, disruption of work life and social life, strain on marriage and finance caused by IVF will almost certainly express itself."[42]

Conclusion

As we have seen, IVF is far from being a simple, efficient and successful procedure as proclaimed by its proponents. Research shows that IVF has serious health implications for the child it produces, and for the woman availing of this technology. We must also consider the human cost of the loss of so many child embryos. Every decent person feels compassion for those who are inexplicably unable to conceive their own children. The end, however, does not justify the means and, with IVF and other assisted reproductive technologies, we can see that some people have very different ends in mind for some embryonic human beings. We have a duty as a society to defend human life, and that responsibility is no less for the tiniest human lives being formed through assisted reproductive technology.

SUMMARY

1. The world's first test-tube baby - a child implanted following *In Vitro* Fertilisation procedures - was born on 25 July 1978. Since then more than 1 million children have been born with the assistance of IVF and other Assisted Human Reproduction (AHR) techniques.

2. *In Vitro* Fertilisation or IVF is actually a term used to describe four different procedures. They are: the production of ova, the extraction of ova, the fertilisation of ova and the implantation of the human embryo.

3. IVF remains a procedure with low success rates. It is a very expensive treatment, and of course patients, or the state, must pay for treatment regardless of success or failure. Strong competition between IVF providers is causing bad practices to develop regarding published success rates and approval of patients for IVF treatments.

4. The most fundamental ethical problem with IVF is that more human embryos are formed in the process than are required for treatment. This loss or destruction of human life is unethical and immoral.

5. This ethical problem also raises serious questions as to the inherent contradiction within the IVF process. On the one hand, IVF providers claim they assist couples with infertility problems to conceive a much-desired child. Yet the embryo children of these couples are casually destroyed if they are “surplus to requirements”.

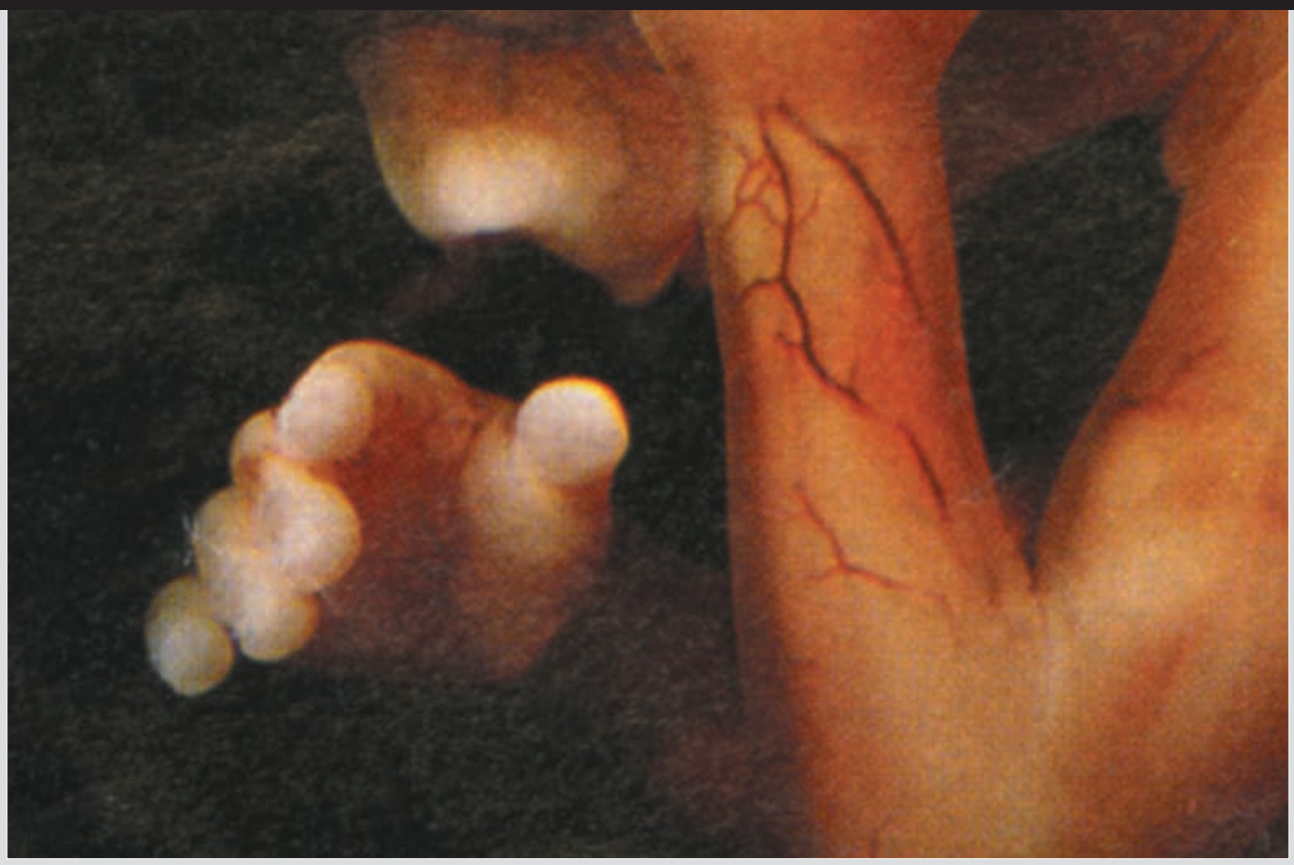
6. Major studies have found that IVF has negative outcomes for children who are conceived and born through this technology. An Australian study entitled *The risk of major birth defects after Intra-Cytoplasmic Sperm Injection and In Vitro Fertilisation* compared IVF children with children conceived in the conventional manner. It found that IVF children are twice as likely to suffer from birth defects. The birth defects associated with IVF include lower birth weight, babies being born premature, an increased risk of the neurological condition, cerebral palsy, in the child, and a range of urological disorders. IVF has also been associated with congenital heart defects, Down's Syndrome, club foot, and cleft palate.

7. IVF also has inherent risks for the woman receiving treatment and most of these dangers arise from the abnormal process of extracting ova from the woman's ovaries. Ovarian Hyperstimulation Syndrome (OHSS) is one of the commonest complications of IVF and it arises from the overstimulation of ovaries through superovulation. Some women availing of IVF treatment have died from this syndrome, including 32-year-old Mrs Jacqueline Rushton from Dublin who died from OHSS, on 14 January 2003, while receiving fertility treatment in the Rotunda Hospital, Dublin.

8. A comprehensive and urgent review of the dangers, for mother and baby, from the IVF procedures, and a commitment to the protection of the human embryo, must be undertaken by any Irish Government.

FORMING, FREEZING AND DESTROYING

"KNOWLEDGE WITHOUT INTEGRITY IS DANGEROUS AND DREADFUL."
Samuel Johnson



WHY HUMAN LIFE DESERVES OUR RESPECT

Babies for Freezing?

The IVF section of our report reveals that Assisted Human Reproduction procedures frequently result in the production of so-called "surplus embryos". Human embryos conceived *in vitro*, and in numbers exceeding the possibility of transfer into the mother's body, are called supernumerary embryos, although they are commonly referred to as "surplus" or "spare" embryos.

The forming of these surplus embryos gives rise to serious ethical dilemmas for all concerned and great controversy surrounds their fate. In fact, only three options exist for these human embryos:

- They can be frozen and stored by a technique known as cryopreservation, albeit not forever
- They can be made available for research/experimentation that will ensure their destruction or
- They can be donated to another infertile couple trying to achieve a pregnancy by AHR.

It would seem, therefore, that a key issue from an ethical point of view is the decision to generate more embryos than can be used in any one treatment cycle.

Creating a Dilemma

Forming surplus embryos creates a dilemma. Freezing those embryos exacerbates that dilemma. It is estimated that currently there are 400,000 frozen human embryos in the United States.[1] This is the result of a booming fertility industry whose success depends on forming many embryos but only using a selected amount. Speaking to *The Washington Post* about the number of frozen embryos, fertility experts said that "although most of the embryos are being held for possible use by couples who wanted them, a large proportion will never be needed."[2] In Switzerland, the Federal Statistics Office, who are usually scrupulous at gathering statistics, have admitted to having no idea how many surplus embryos they have stored.[3]

But the huge number of frozen embryos is not the only problem. Many embryos do not survive the freezing process. If they do survive being frozen, they may not survive the thawing process necessary for their implantation.[4] Also, the process of freezing and thawing can result in "poor quality" embryos, which are then routinely discarded without even an attempt at implantation.[5] In fact the Human Fertilisation and Embryology Authority (HFEA) in England admit that many human embryos are killed as a result of freezing and thawing, and those who do survive the process have only a 12% chance of surviving implantation and being born.[6]

Freezing embryos brings increased risks and losses. Our report has already discussed the dismal success rates of IVF and how these rates result in the loss of many early human lives. IVF procedures using frozen embryos are even more inefficient. The Center for Disease Control (CDC) in the US has stated that the success rates for IVF are substantially lower when using frozen embryos than with embryos that have not been frozen.[7] Check *et al.* also found in their study that a successful implantation was much less likely to result when using frozen embryos rather than embryos which had not been frozen.[8]

The risks involved in IVF also appear to be much greater when using frozen embryos. One study from Brown University in the US found that the risk of ectopic pregnancies rises significantly from 1.8% to 31.6% for women who undergo IVF using frozen embryos.[9]

In 2002, a boy was born almost nine years after he was conceived *in vitro* and frozen.[10] In another study, embryos were frozen, thawed, refrozen and rethawed before transfer to a woman's uterus.[11] While these stories may sound disturbing, the most distressing aspect of the problem with embryo freezing remains the fate of the embryos. Laws that permit cryopreservation of embryos usually indicate a maximum time-span for freezing, which varies from country to country but usually lies somewhere between one and five years. This means that every year the lives of tens of thousands of "unused" embryos can be legally ended. This is a prenatal massacre and should be avoided by outlawing the artificial conception of embryonic human beings who are then kept in a state of unnatural existence.

The Dignity of the Human Person

The freezing and storage of embryos entails a

serious failure in the respect owed to human beings. It is not acceptable that embryonic human beings should be placed in a situation where their natural development is suspended and their lives endangered. Freezing and storing the child embryo undermines the dignity that must be afforded to all human beings, whatever his/her status.

This is not just the view of religious or pro-life activists. It is worth noting that the Irish Medical Organisation (IMO) adopted, by a large majority, the following recommendation at its 1996 AGM: "This AGM affirms that the freezing of embryos is inconsistent with the medical profession's long held tradition of respect for human life at all stages of development."[12] The authors of our report believe that the authentic humanity of the embryo must be recognised, and for this reason we urge strongly that no further embryo freezing be allowed in Ireland.

Experimenting on the Human Embryo

The second fate that may await the unfortunate embryo deemed "surplus" to requirements is that of using them for scientific experimentation or research. This is, in fact, the commonest fate of embryos taken out of storage, and is a cause of great controversy, given that scientists are eager to experiment on these tiny humans. The area of research on embryos either formed specifically for this purpose, or left over from IVF, is gaining an immense amount of attention of late, and has huge ethical, moral and legal implications. For this reason, and because a large proportion of the debate about human embryos is in relation to research, we deal separately with this topic in Chapter 3 of our report.

Donating the Human Embryo

A third option for those controlling the fate of the human embryo is that of donation. Ideally, excess embryos in storage, and no longer wanted by the commissioning couple, should be voluntarily donated to another couple for implantation. This is the only option that can uphold their inherent dignity and worth as human beings. However, donation of human embryos by a couple to another couple for implantation is uncommon.

A study by Hounshell *et al.* found that couples who did not use their surplus embryos were four times more likely to destroy them than to donate them.[13] There may be many reasons for this. Some researchers agree that a couple's initial choice to donate embryos is more of an idealistic plan rather than a purposeful decision.[14] That said, an organisation based in the US promotes an embryo adoption programme known as the Snowflakes Program.

"Snowflakes" began in 1997 in response to the huge numbers of human embryos being stored by IVF providers, and in keeping with the fact that human beings begin life at fertilisation. They present an alternative approach to the argument that since all unused embryos are essentially doomed, science should be allowed to use them as scientists see fit. The project attracted widespread attention, including television and radio programmes and a high-profile story in *Newsweek*.[15] While "Snowflakes" must be commended for trying to resolve ethically this regrettable dilemma not of their creation, the commonest fate for supernumerary embryos still is that of destruction, either directly or by experimentation. The sheer number of human beings artificially formed without concern or caution, and now stored in an indeterminate state, makes it very difficult to protect each and every one of these tiny human lives.

The Core Matter

And so this brings us on to one of the most difficult and controversial topics surrounding the issue of embryonic stem cell research: what is done with the frozen embryos who are currently in storage and are destined for destruction?

Firstly, the very fact that supernumerary embryos are proposed for destruction should lead us to question the ethics of producing these embryos in the first place. While it may be true that some of the frozen human embryos will eventually die, that is no justification for taking an active role in their premature death. Inmates on Death Row are also destined to die; should we allow scientists to treat them as research subjects, or to conduct experiments on these men and women before they are executed for their crimes? The chance of survival of any human life - at embryonic stage or otherwise - should not be the basis for respect accorded and due to that human life. Deliberately experimenting on these

embryos undermines their worth and treats them as research material.

Stem Cells from Frozen Embryos

Apart from the right-to-life issue for these embryonic human beings, it would appear that the promise of acquiring stem cells from embryos, currently frozen, is a false one of the would-be genetic engineers. Leading fertility experts agree that frozen embryos would yield a far smaller number of stem cell lines than is often assumed. Dr William Gibbons, of the Jones Institute for Reproductive Medicine in Virginia, says that the Institute has about 200 frozen embryos available for destructive research but "there is no guarantee that we would get any stem cells from those 200 frozen embryos."[16] Dr Barry Behr of Stanford University notes that "by far the vast majority of embryos that are frozen are not good. If we thawed 10,000 embryos, we would get 100 or so that are viable."[17] So, behind the seemingly impressive number of frozen embryos that are being proposed for stem cell research, the reality is that the actual number of stem cell lines likely to be produced from them is so small as to be clinically useless. Dr David Prentice of the Do No Harm organisation says that, "in order to treat diseases (which is still a very distant prospect using human embryonic stem cells) hundreds of thousands of more embryos, beyond those currently frozen and available for research would be needed."[18] Prentice goes on to suggest that this number of embryos could only be achieved by a deliberate effort to produce new embryos for the sole purpose of destroying them - an outcome the use of frozen embryos is supposed to avoid, but would, in fact, most likely encourage.

Conclusion

As was outlined in this chapter, the formation of so-called "surplus", "excess" or "spare" embryos is a recipe for disaster. Once they have been artificially formed these "unwanted" human lives are destined to end up being stored in an unnatural environment only to be destroyed later by experimentation. The first principle of ethics is that we must do what is right and shun what is wrong. It is important to remember this when dealing with human life at any stage of development from embryonic through to adulthood. It is clear that currently we have an enormous ethical dilemma on our hands with frozen embryos.

This is the result of an increasing lack of respect for life and the profit-driven agenda of the biotech industry. It is also very clear what we must do to prevent this tragedy from getting even worse: we must immediately stop forming "excess" embryos and allow no further freezing of embryos.

SUMMARY

1. Human embryos conceived through IVF but not transferred into the mother's body, are called supernumerary embryos - commonly referred to as "surplus" or "spare" embryos.

2. The forming of these surplus embryos gives rise to serious ethical dilemmas. Only three options exist for these human embryos: freezing, experimentation, or donation.

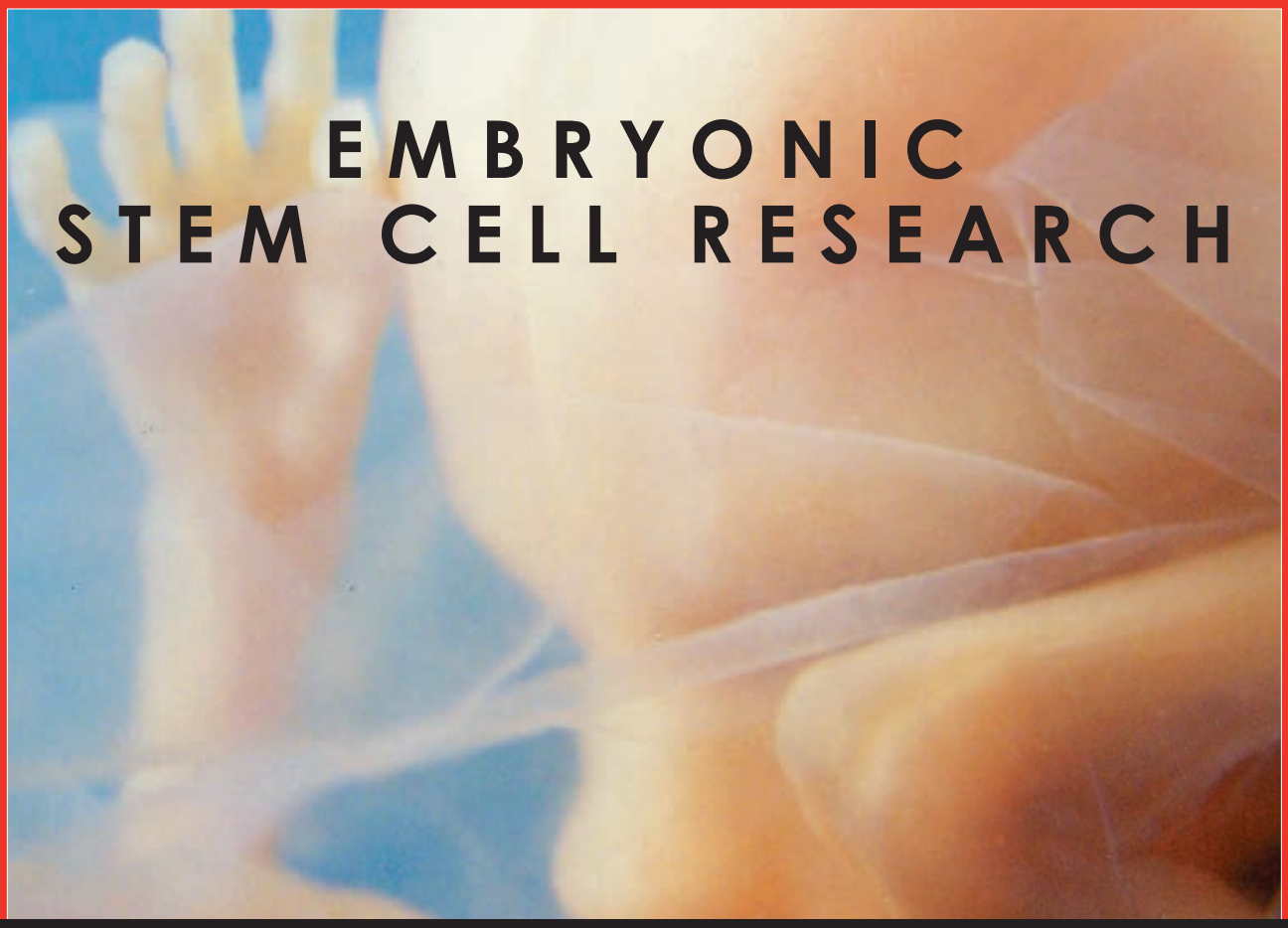
3. Forming surplus embryos creates a dilemma. Freezing those embryos exacerbates that dilemma. Many human embryos are killed as a result of freezing and thawing and those who do survive the process have only a 12% chance of surviving implantation and being born. Freezing the human embryo also increases the risks of the already risky procedure of IVF.

4. Donating the human embryo is rare - couples are more likely to have the embryo destroyed than to donate him/her.

5. It is very difficult to extract stem cell lines successfully from frozen embryos. However, public acceptance of the use of the human embryo for this purpose paves the way for acceptance of the formation of embryos for the sole purpose of stem cell extraction.

6. Human life is sacred and should be afforded dignity and respect. The only way to avoid the ethical dilemma of what to do with so-called surplus embryos is not to produce them in the first place.

EMBRYONIC STEM CELL RESEARCH



"FIRST, DO NO HARM."

Hippocrates

WHY HUMAN LIFE DESERVES OUR RESPECT

Embryonic Stem Cell Research

Over the last decade or so human embryonic stem cell research has become one of the most controversial developments in the international bioethical debate. Before exploring this complex scientific and philosophical topic, it is necessary to pause for a moment and explore some basic facts about biotechnology.

What is a Stem Cell?

A stem cell is the popular name for a cell that is undifferentiated or immature. If a cell is undifferentiated, it has not yet begun to develop to maturity - to differentiate - into one of the more than 200 types of tissue found in the human body, e.g., blood, bone, fat, brain etc.. Thus a differentiated cell is a "specialised cell type that carries out a specific function in the body, such as a heart muscle cell, a neuron in the brain or a red blood cell".[1] Before differentiation has occurred a cell is commonly referred to as a stem cell.

Two types of stem cells are generally talked about: embryonic stem cells and adult stem cells. Embryonic stem cells are derived from human embryos about one week after fertilisation. At this stage of development the embryo is referred to as a blastocyst who, under a microscope, looks like a hollow ball with a cluster of cells inside. These cells are stem cells that will eventually grow into every tissue type in the body as the embryo develops.[2] Adult stem cells are found in many of our bodily tissues throughout our lives. These stem cells have been discovered in bone marrow, blood, brain, fat, skeletal muscle, stomach, liver, pancreas, and most recently, even in the pulp of miscarried babies' teeth.[3] Adult stem cells exist in unborn children, infants, young children, as well as in adults.

Therapeutic Benefits of Stem Cells

You may be wondering why scientists and biotech companies are so interested in stem cells. The reason is that some scientists believe that stem cells may be used to help treat or cure damaged organs, or degenerative diseases such as Parkinson's disease, Alzheimer's, and spinal cord injuries. Their theory is that stem cells could be used in their undifferentiated state to grow into the tissue types that are damaged or affected by the degenerative condition. The hope is that the stem cells, once injected into the body, will continue to divide and grow, eventually repairing the damaged organs. **While certain therapeutic benefits have already been achieved using adult stem cells, we have yet to see a positive treatment result from the use of embryonic stem cells.[4]**

There is controversy surrounding some, but not all, stem cell research. No one opposes the use of adult stem cells for therapeutic benefits, and no objection exists to the use of stem cells derived from other non-embryonic sources, such as umbilical cord blood. Much controversy surrounds embryonic stem cell research and with good reason: the human embryo is destroyed in the process of extracting its stem cells. Opponents of this type of research, the authors of our report included, believe that this constitutes the destruction of human life and argue that destroying embryos for the purpose of harvesting their parts reduces early human life to the status of research material.

In this chapter we deal with the ethics, practice, and business of embryonic stem cell research. Obviously the area of adult stem cells has a huge part to play in this debate, and we deal with this topic in Appendix II.

Experimenting on Human Beings

Like many of the other issues discussed in our report, the fundamental ethical problem with research on embryos is that this type of research will assure the destruction of many early human lives. It is not possible to extract stem cells from the living human embryo without destroying him/her in the process. International documents such as the *Nuremberg Code,* the World Medical Association's *Declaration of Helsinki*, and the *United Nations Declaration of Human Rights* reject the use of human beings in experimental research without their consent, and permit research only if there is therapeutic benefit for the human subject.[5] Clearly, the child embryo has not given consent to being experimented on, and even the strongest advocates of embryo research agree that it is by no means therapeutically beneficial to the embryo. Therefore an ethic which condones research using human embryos violates the standards set out by these doc-

uments. It also undervalues human life, damages the integrity of science and medicine, and degrades society.

Forming in Order to Destroy

In order to obtain embryonic stem cells you first need a human embryo. These embryos are formed through *In Vitro* Fertilisation. They may be formed specifically for the purpose of destroying them for their stem cells, or scientists can use so-called "surplus" embryos which were originally intended to be brought to term but are no longer wanted. We have dealt with the problems surrounding the use of supernumerary embryos in an earlier section of our report. This scientific option - that of forming a human life only to destroy him/her again - is equally problematic and should not be condoned by any civilised society.

If society tolerates the formation of human embryos solely in order to harvest their body parts for experimentation we shall have taken a step too far. While the loss of any human life is tragic, including those embryos lost in an IVF cycle, the deliberate formation of human life for the absolute and assured destruction of this life is appalling. Wesley Smith, author of *A Consumer's Guide to a Brave New World,* writes that with the formation of human life for the purpose of destroying it, we "abandon the outlook that holds all human life to have an intrinsic value simply because it is human; one subgroup of human life becomes, in effect, dehumanised and reduced to the moral status of a mere natural resource."[6]

Inefficiencies of Embryo Research

The extraction of stem cells from the human embryo, and transformation of these cells into viable stem cell lines is, in any case, fraught with problems. Most attempts end in failure. A May 2003 study found that biotechnologists still had no more than an approximate 2.5% success rate.[7] Thus, out of about 11,000 embryos thought to be available for research use, the paper estimated that roughly 275 new viable embryonic stem cell lines might be derived, and then "only if all of the embryos donated to research in the United States are used exclusively to create stem cells, which is highly unlikely to occur". Harvard University reported in 2004 that its researchers required 344 IVF embryos to derive just 17 usable embryonic stem cell lines.[8] That is a productivity rate of about one stem cell line for every twenty attempts. So we can see that even generating stem cells from embryos is an extremely inefficient process, and it means that countless human lives will be lost to acquire just a few stem cell lines for researchers to experiment with. Furthermore, these stem cell lines have failed to yield any results.

Problems with Embryo Research

The cost of the life of the human embryo, and nil efficacy, these are not the only issues with embryonic stem cell research. Before embryonic stem cells can be used in humans, two major problems must be overcome: tumour formation and immune rejection, problems which do not appear to exist with adult stem cell therapies. Studies on animals have demonstrated the significant danger that these embryonic stem cells can cause tumours. As reported in the *Proceedings of the National Academy of Sciences* in December 2000, researchers at Harvard Medical School injected mouse embryonic cells into rats in an attempt to alleviate Parkinson's-like symptoms. Of the twenty-five rats receiving the injections, five died of brain tumours caused by the stem cells. In other words, the treatment actually killed one-fifth of the animal subjects, even though the researchers reduced the number of injected cells from 100,000 to 1,000 - just 1% of the usual dose.[9] A later Parkinson's experiment in 2003 published in the journal *Stem Cells* showed similar results.[10]

In 2003 a team of Japanese researchers transplanted embryonic stem cells into the knee joints of mice to determine whether the cells could grow cartilage. This didn't happen and instead the cells caused tumours "destroying the joints". This led the researchers to conclude that it was "not possible to use embryonic stem cells to repair joint tissues."[11] More recently, it was reported in February 2004 that researchers from the University of Calgary had also discovered tumour formation in mice as a result of using embryonic stem cells.[12] Tragically, mice aren't the only species to have suffered. A study by Folkerth *et al.* that appeared in the medical journal *Neurology*, reported the death of a patient who was apparently killed when he was injected with embryonic stem cells. The patient died when

irregular tissue developed in his brain. The researchers suggested that this may have been caused by the stem cells developing erratically in his brain.[13] Results like these are causing many past supporters of this controversial research to speak out against it. The *San Francisco Chronicle* recently reported that doubters are now coming out against embryo research. Paul Billings, who studied stem cells' effects and co-founded a stem cell bank, said that hopes for medical treatments based on embryonic stem cells are now "very remote". He continued that, "the problems are so complex that we're not likely to be able to tackle them with the stem cell gambit in the foreseeable future."[14]

Immune Rejection

The second major problem with embryonic stem cell research is the worry that the patient's immune system will reject the cells extracted from the embryos, just as the body tries to destroy transplanted organs. This is because the genetic make-up of the stem cells to be injected will be different to the genetic make-up of the patient's own cells. This problem does not exist for adult stem cells, as these are genetically identical to the patient's own cells, and won't cause an immune reaction. Researchers have attempted to develop solutions to this problem, such as genetically engineering the cells so as not to cause an immune response. Another approach is to manufacture cloned embryos using the patient's own cells, so that the stem cells extracted from the embryo will match genetically those of the patients. This procedure is called therapeutic cloning, and is discussed in detail in Chapter 5 of our report.

As Robert Lanza says in *Scientific American,* "Embryonic stem cells and their derivatives carry the same likelihood of immune rejection as a transplanted organ because, like all cells, they carry surface proteins, or antigens, by which the immune system recognizes invaders. Hundreds of combinations of different types of antigens are possible, meaning that hundreds of embryonic stem cell lines might be needed to establish a bank of cells with immune matches for most potential patients. Creating that many lines would require millions of discarded embryos from IVF clinics."[15]

False Hopes

To date there have been no successful therapies using stem cells derived from human embryos. On the other hand, up to 65 successful treatments have been carried out using non-embryonic or adult stem cells.[16] Giving false hope to people by allowing them to think that cures using embryonic stem cells are just over the horizon - when we don't even know if they are coming at all - is a cruel practice. Dr Peter Hollands, who worked as a clinical embryologist at Bourn Hall Clinic, the world's first IVF unit, has said that "embryonic stem cells have yet to be used to treat any form of disease," and that it is "common sense" to direct resources towards adult over embryonic research.[17] Jean Swenson, a quadriplegic, wrote in *The Minnesota Daily*, "I fear many of us are being sold an imaginary garment of hope - an illusive belief that embryonic stem cells will cure us."[18]

The Lancet, a prestigious British medical journal which has supported embryonic stem cell research, recently called the promise of cures from destructive embryo research "sensationalist" and "hype". In an editorial from 4 June 2005, *The Lancet* reported: "No safe and effective stem cell therapy will be widely available for at least a decade and possibly longer."[19] Cornell University stem cell scientist Shahin Rafi said: "just injecting stem cells is not going to work. First, you have to be able to differentiate the cells into functional, transferable tissues. We don't really know how to do this yet."[20] It would seem that cures gained from destroying human embryos are more of science fantasy than science fact. Those who are demanding approval and funding for embryonic stem cell research offer misleading promises about non-existent embryonic stem cell cures. Those who are serious about clinical trials and treatments, and not just basic research, are using adult stem cells or umbilical cord blood to find treatments that really work. These researchers are on the cutting edge of stem cell research because they are seeing positive, successful results in an ethically acceptable field of scientific medicine. It is the view of the authors of our report that we should desist from wasting funds on unethical embryonic stem cell research and focus our precious resources on ethically legitimate adult stem cell treatments that have been proved to work.

Money is Motive

In common with many other areas in the biotechnology industry, money is often the motive behind the huge push for the legalisation and funding of embryo research. As Dr Francois Pothier, a Ph.D. in cellular biology, stated before the Canadian House of Parliament: "there is no money in adult stem cell research."[21] Adult stem cells usually come from the patient's own body and thus need not be purchased, in contrast to embryonic stem cells. Moreover, if embryonic stem cells were successfully used, the treatment would leave the patient dependent on costly anti-rejection drugs, whereas adult stem cells derived from the patient do not require such ongoing medications.

If researchers developed usable embryonic stem cell lines, this would generate huge profits for the biotech industry. Embryo stem cells would become a product or commodity which biotech companies could buy and sell. In an article entitled "Mixing Business with Stem Cells", author Neil Munro explains that "the media coverage has often missed the pecuniary interests of the scientists who have been prominent in supporting government funding for research into the use of stem cells from human embryos."[22] While such scientists are often prominent faculty members at prestigious universities and public research institutions, they are also often board members and shareholders of biotechnology companies which stand to make hefty profits from embryonic stem cell research. "They are, in short, both disinterested scientists and very interested entrepreneurs," concludes Neil Munro.

Financing the Destruction of Human Life

Although there may be money to be made from using embryonic stem cells as opposed to adult stem cells, researchers are now finding it difficult to find and maintain investment for their experiments because of the failure of embryonic stem cells to produce positive results. According to *The Wall Street Journal,* private investors have poured almost $100 billion into the biotech industry in the last 25 years.[23] However, in recent times, less and less of this money is going towards controversial embryo research. There are abundant reasons for caution on the part of the investors, the main one being that results are not forthcoming from the research which their investments are funding. Even if reliable embryonic stem cell therapies can in the future be developed, and that is no sure thing, it will take many years for the technology to become a usable technique. To investors, this research is viewed as a black hole, sucking investment in but giving no returns. The dire safety problems, such as tumour formation and immune rejection, that accompany embryonic stem cell research, have prompted scientists to experiment with cloning of human embryos; an issue which is explosively controversial and raises huge ethical concerns. This also would take many years, and hundreds of millions of dollars, to accomplish - not an attractive prospect for investors.

The controversy surrounding embryonic stem cell research is also a factor that affects funding. *The New York Times* reported: "some executives and analysts say that the controversy has kept companies and investors from the field," while the "attention paid to the potential of stem cells has spurred investment in companies using non-embryonic cells."[24] So we see that adult stem cell research, and its medical applications, are moving forward at a tremendous pace, spurring heavy private investment in a field where "the practical use of adult stem cells is not 10-15 years away but well on the commercialisation process."[25] Even William Hasteline, who is an embryonic stem cell research advocate, and Chief Executive Officer of Human Genome Sciences said: "The routine utilisation of human embryonic stem cells for medicine is 20 to 30 years hence. The timeline to commercialisation is so long that I simply would not invest. You may notice that our company has not made such investments."[26]

Reporter Luke Timmerman concluded that investors "aren't committing billions of dollars because society hasn't clearly decided whether the research is moral, the field is too risky, the business model too vague. Researchers don't know how to control embryonic stem cells…and they don't know how to do it cheaply, conveniently or consistently enough to make it a viable business."[27] This means that we may reach a situation where controversial research surrounding embryonic stem cells and human cloning may be stopped due to the researchers being financially strapped. The *Financial Times* sums up the situation: "The finances of the world's cloning com-

panies are so precarious that a lack of funding may accomplish what moral objections have so far been unable to do: bring research in this area to a halt."[28]

Conclusion

Research on human embryos is morally, ethically, scientifically, and medically, wrong, and should be outlawed in every country. This research destroys early human lives and undervalues the embryonic human being to the moral status of penicillin mould. Furthermore this controversial research is unnecessary, as ethically acceptable alternatives to the destruction of these human embryos exist. Moreover, it is, in fact, completely unethical to redirect funds and resources needed to develop the successes of *ethical* stem cell research towards destructive research that is not yielding any results.

The controversy surrounding embryonic stem cell research boils down to one essential question: does human life have intrinsic value simply because it is human? The authors of our report believe the answer must be "yes", and that means we must reject all unethical technologies and philosophies that lead to the objectification of human life, including embryonic stem cell research. If our answer is "no", then we are prepared to sacrifice the inviolability of human life on the altar of biotechnological power, we are willing to discard our belief in the inherent value of human life and we are ready to exclude from the human family, the smallest form of human being: the child embryo.

SUMMARY

1. A stem cell is a popular name for a cell that is undifferentiated; that means it has not yet begun to develop to maturity.

2. Some scientists believe that stem cells may be used to repair damaged organs, and to treat some degenerative diseases such as Alzheimer's, Parkinson's, and spinal cord injuries.

3. There are two types of human stem cells, namely adult stem cells and embryonic stem cells. Adult stem cells can be derived from certain tissues including blood, brain, bone marrow, fat, and umbilical cord blood.

4. Embryonic stem cells can be derived from human embryos about one week after fertilisation. The extraction of embryonic stem cells is unacceptable because it kills human embryos.

5. A number of international documents, including the *Nuremberg Code* and the *United Nations Declaration of Human Rights,* reject the use of human beings in experimental research, and so embryonic stem cell research is in violation of these codes.

6. Some embryo research involves experimenting on those so-called "surplus" embryos who are left over from IVF. Other research is carried out on embryos who are deliberately formed for the purpose of destroying them to extract their stem cells.

7. There are two major problems with using embryonic stem cells as treatments for patients: these are tumour formation and immune system rejection.

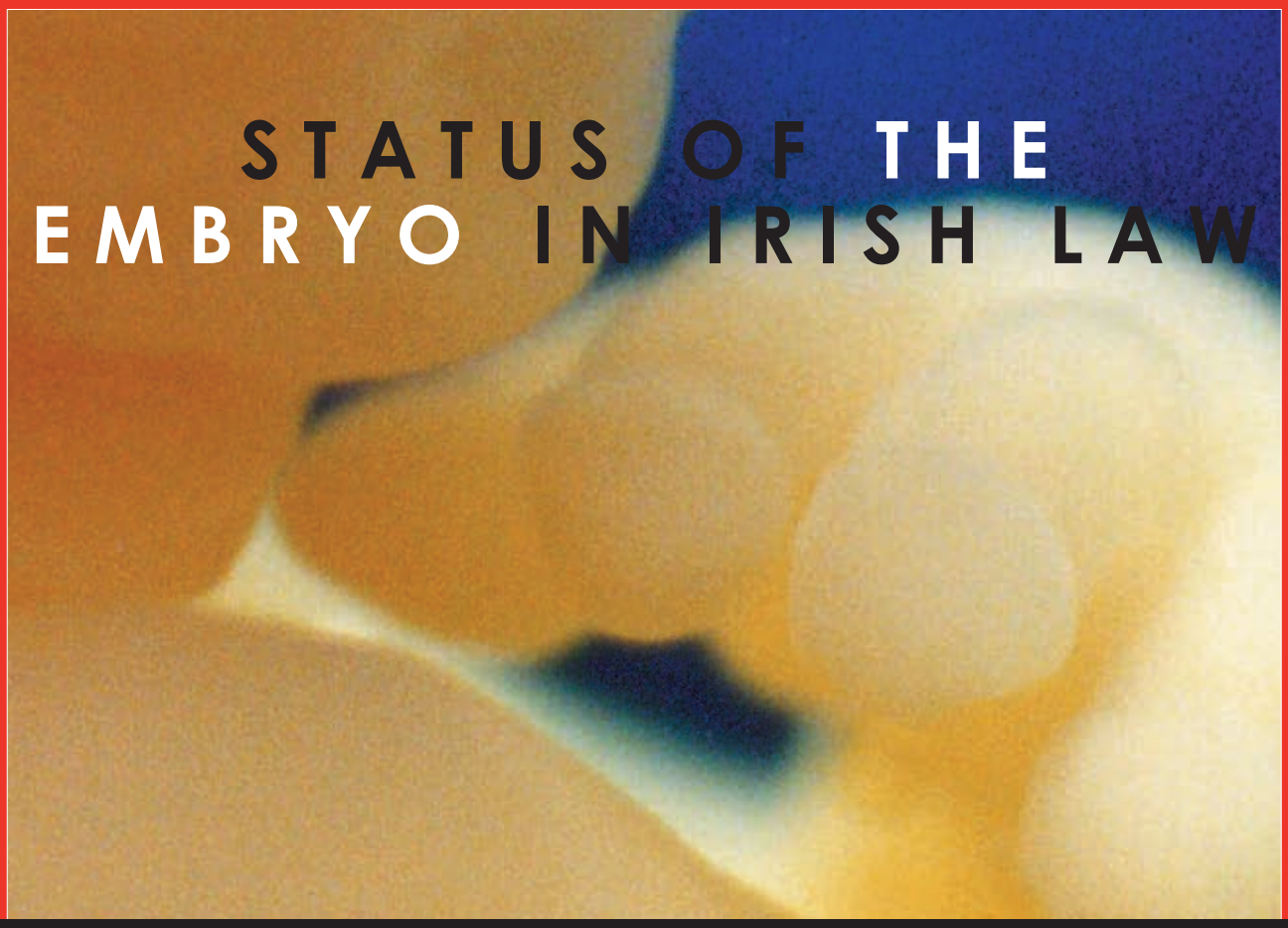
8. Tumours have developed in both adults and animals who were injected with embryonic stem cells, and to date, there have been no successful therapies developed from using these cells.

9. The profit motive drives the push to use embryonic stem cells as opposed to adult stem cells. Patients would have to purchase embryonic stem cells, and the costly drugs to prevent their immune system from rejecting them. This would not be the case with adult stem cells.

10. Many private investors in biotechnology are withdrawing their money from embryonic stem cell researchers because they are not seeing any positive results. On the other hand, the successes of adult stem cell research are spurring major investment because of the beneficial therapies it has produced.

11. Embryonic stem cell research destroys the life of the earliest member of the human family. It is ethically, morally, scientifically, and medically, wrong, and it should be outlawed in every country. Embryos have an intrinsic value because they are the earliest form of human life, and should never be undervalued to the moral status of research material.

STATUS OF THE EMBRYO IN IRISH LAW



"THE PEOPLE'S GOOD IS THE HIGHEST LAW."
Cicero

WHY HUMAN LIFE DESERVES OUR RESPECT

Throughout the *Report of the Commission on Assisted Human Reproduction* (CAHR), references are made to the necessity, or lack of necessity, of legal regulation to govern the reproductive issues discussed in that *Report*. We must consider now the legal protection that currently exists in this regard, and what further legal protection can be put in place to maximise the protection of the unborn.

Previously, pro-life concerns regarding the protection of the unborn focused on ensuring that every unborn child, regardless of the circumstances of conception, is protected under Irish law. Previous case law and referenda (with the exception of the defeated 2002 abortion referendum[1]) focused on the circumstances under which abortion might be permitted, whether the unborn child is conceived through rape, or if the mother is suicidal. Therefore, legally, the concerns to date have been whether Article 40.3.3^{o} provided protection for all unborn, regardless of the circumstances of their conception.

Now, when it comes to Assisted Human Reproduction, the focus is somewhat different. In considering legal protection for the unborn in this instance, the following two points are very important. Firstly, we must ensure that the unborn are protected, starting from fertilisation (the pronuclear stage), and not from any later date, such as implantation. Furthermore, we must endeavour to ensure that all the unborn, whatever the manner or method of their conception (and by this we mean as nature intended or in a test tube), are protected, starting from fertilisation. It is important to note that though we argue that legal protection is needed for all unborn, no matter how or where they are conceived, this is not an endorsement of artificial means of conception. Throughout our report, we explain our position and concerns regarding artificial means of conception and the associated difficulties. IVF procedures currently are being carried out in Ireland, and thousands of embryos are frozen. We must do what we can to protect all the unborn.

Before looking at the current legal Irish definition of "the unborn", and before we consider strengthening the existing legal protection for the unborn, we must endeavour to ensure that all unborn life actually falls within the meaning of "the unborn" and therefore is protected. Some parties would argue that this may not be the case automatically, e.g. the *Report* of the CAHR raises questions as to the legal status of cloned organisms and as to whether cloned organisms fall within the meaning of "the unborn" in the *Constitution of Ireland* at all. In their discussion of embryos produced for regenerative medicine, where the ovum is not fertilised in the conventional manner but has its nucleus replaced by a nucleus from the person being cloned, we see the *Report* states that:

> **a)** this cloned organism is a new type of biological entity never before seen in nature; and
> **b)** many would see this entity not as an embryo but as an "activated ovum".

Later, in the same chapter, we are told that despite the method of its formation, the cloned organism is regarded by many professionals in this field as morphologically indistinguishable - morphology being the branch of biology that deals with form and structure of organisms without consideration of functions - and functionally indistinguishable from the embryo generated by fertilisation. Chapter 6 of our report details the conclusive evidence that no distinction exists between what is called spuriously a "pre-embryo" and an embryo. Such distinctions have gathered no support from the international community of embryologists and biologists. There is no conclusion drawn on this point by the CAHR, but this shows that even with a clear definition of the unborn (i.e. explicitly including all the unborn post-fertilisation) arguments may be made by those with vested interests that some embryos should fall outside this definition.

Therefore, it is not enough to have watertight legal protection for the unborn, if certain classes of embryos do not fall within the legal meaning of "the unborn" at all. It is our belief that all embryos, howsoever created, should fall within the legal meaning of "the unborn" and should therefore have the protection of Irish law. The CAHR *Report* looks at the various types of legal regulation that exist in relation to regulation of Assisted Human Reproduction, cloning and surrogacy. For the reasons outlined earlier in our report, we are not recommending that there should be regulation in any of these areas, as such manipulation of embryos should not, in any event, be permitted. Instead, the Irish Government must ensure that all embryos, howsoever or wheresoever created, be protected under Irish law, starting from the moment of fertilisation.

It is worth highlighting some of the fundamental con-

tradictions that appear in the *Report*'s recommendations regarding regulation. The *Report* recommends legislation that would permit cloning for some purposes, but then recommends prohibiting it for other purposes. That must be questioned, and the CAHR seems to misunderstand the fundamental point. In examining an issue as important as cloning, the CAHR should have investigated whether such a practice is legally and ethically acceptable. If the *Report* recommends legislation prohibiting cloning in certain instances, i.e. for reproductive purposes, the only logical reason for such prohibition can be the ethical one. How then can the CAHR recommend legislation permitting it in other instances, i.e. for the purpose of regenerative medicine? Suffice it to say, in discussing the unborn and the protection that they should be guaranteed, we are treating all humans, howsoever created, as deserving this same protection.

Legal Definition of Unborn

The CAHR *Report* looks at the historic legal interpretation of the "the unborn". In McGee v AG[2] (in 1974 and before the 1983 insertion of Article 40.3.3º into the *Constitution of Ireland*) Walsh J. indicated that the right to marital privacy did not extend to the use of family planning methods that would endanger human life. However, he did not go on to consider where human life begins. Griffin J. in the same case said that the right to use contraception did not extend to a right to use abortifacients: "as in the case of abortifacients, entirely different considerations may arise." Again, no effort was made to define "abortifacient".

Article 40.3.3º of the Constitution provides:

> Admhaíonn an Stát ceart na mbeo gan breith chun a mbeatha agus, ag féachaint go cuí do chomhcheart na máthar chun a beatha, ráthaíonn sé gan cur isteach lena dhlíthe ar an gceart sin agus ráthaíonn fós an ceart sin a chosaint is a shuíomh lena dhlíthe sa mhéid gur féidir é.

In English this reads:

> The State acknowledges the right to life of the unborn and, with due regard to the equal right to life of the mother, guarantees in its laws to respect, and, as far as practicable, by its laws to defend and vindicate that right.

The Irish "*na mbeo gan breith*" translates directly "of the living, not yet having been born". The law is generally required to be precise and defined, and there has been much talk about the ambiguity of the term "the unborn" and the indeterminate nature of this term in deciding when human life begins, or when the protection afforded by Article 40.3.3º begins to apply to human life. However, on a literal interpretation, the fact that the term is unqualified does not cause any problem in itself, and logic would dictate that the term should be given a broad interpretation so as to cover all the unborn. The problems and ambiguity only arise when one tries to interpret the term so as actually to limit its scope in some manner. The constant attempts by liberals to interpret Article 40.3.3º as permitting abortion in certain instances, and their attempts therefore to deny *some* of the unborn the protection of the Article, are what has caused difficulties to date.

The CAHR does refer in a footnote on the 1999 government-sponsored study, *Bunreacht na hÉireann: a Study of its Irish Text*,[3] by Dr Micheál Ó Cearúil, of the Irish-language text of the *Constitution of Ireland*, but either fails to grasp, or deliberately ignores, the evidence that Ó Cearúil adduces regarding the wide range of meanings the Irish word "*beo*" has. This range is so wide as to include, without any difficulty, human life from fertilisation.

Where consideration has been given to date to the meaning of "the unborn", the decisions have not focused on whether the term "the unborn" should mean the embryo before or after implantation. In certain cases, e.g. SPUC (Ireland) Limited v Open Door Counselling Limited and the Dublin Well Woman Centre Limited (1988)[4] Hamilton J. did refer to life commencing at conception. (However, not every lawyer agrees that this is a binding part of his judgement). The 'X' Case of 1992[5] and the subsequent referenda focused on whether abortion should be permitted when it is claimed that there is a threat to the life, as opposed to the health, of the mother, and, with the exception of the 2002 abortion referendum, did not focus on when protection for the unborn begins. So we assume that the term "the unborn" as used in Article 40.3.3º covers embryos pre-implantation. It is interesting to note that one of the arguments given in 1983, as to why the proposed constitutional amendment should be opposed, was that the passing of Article 40.3.3º would call into question the legality of IUDs etc.. Mr Dick Spring, the then Tánaiste, said at that time:

It is clear that the word “unborn” is likely to be interpreted by the Supreme Court as the moment at which the human ovum is penetrated by a sperm - the moment when human life commences.

Indeed, as the pre-implanted embryo is not specifically excluded from Article 40.3.3°, one can only assume that such pre-implanted embryos are protected. It is interesting to note that the vast majority of commentaries arguing that Article 40.3.3° does not protect the pre-implantation post-fertilisation embryo, focus primarily on the ensuing legal difficulties that such an interpretation might cause for the legality of the “morning-after” pill, IUDs, IVF or the freezing of embryos, but do not justify objectively or explain logically why the pre-implanted embryo is excluded legally from the protection of Article 40.3.3°.

In the 2002 referendum, when new Constitutional Articles (being Article 40.3.4° and Article 40.3.5°) were put to the people along with a new *Protection of Human Life in Pregnancy Act 2002*, the issue of whether life was being protected, starting from fertilisation or from after implantation, was fundamental to the referendum. Section 1(1) of the Protection of Human Life in Pregnancy Act 2002 defined "abortion" as "the intentional destruction by any means of unborn human life after implantation in the womb of a woman”. Therefore, the destruction of embryos prior to implantation would not have fallen within the legal definition of abortion and would not have been a criminal act. At the time of the 2002 referendum, if the new Constitutional Articles (and the Protection of Human Life in Pregnancy Act) had been accepted by the people, the only remaining legal protection for the unborn prior to implantation would have been the residual protection stemming from Article 40.3.3°, but as this was not specifically provided for in any legislation, and bearing in mind the liberal litigators and courts, a majority of people did not consider this sufficient protection, and hence, the referendum was defeated.

It is indeed most interesting to note that the CAHR *Report* does not mention the 2002 referendum or its defeat at all. This is despite the fact that, more than any previous proposal, the referendum provoked legal debate as to whether the term “the unborn” in the Constitution included the pre-implanted embryo. The CAHR does acknowledge the uncertainty of the meaning of the word “the unborn” and does recommend clarification. However, if it acknowledges uncertainty as regards the meaning of “the unborn”, it should not be recommending regulations that may be unconstitutional.

Many people argue that the interpretation of “the unborn” as being from fertilisation will cause problems for current IVF practices, and for the Pill and “morning-after” pill. Never has “the unborn” been interpreted by the Courts in a manner so as to exclude the unborn post-fertilisation. This should be questioned in itself, and it means that current practices may be outside the law. It should not be used to jeopardise future generations of the unborn conceived, even though that is what the CAHR *Report* proposes.

SUMMARY

1. There have been no previous legal cases where the seminal point of the case was whether “the unborn” means unborn from fertilisation or from implantation.

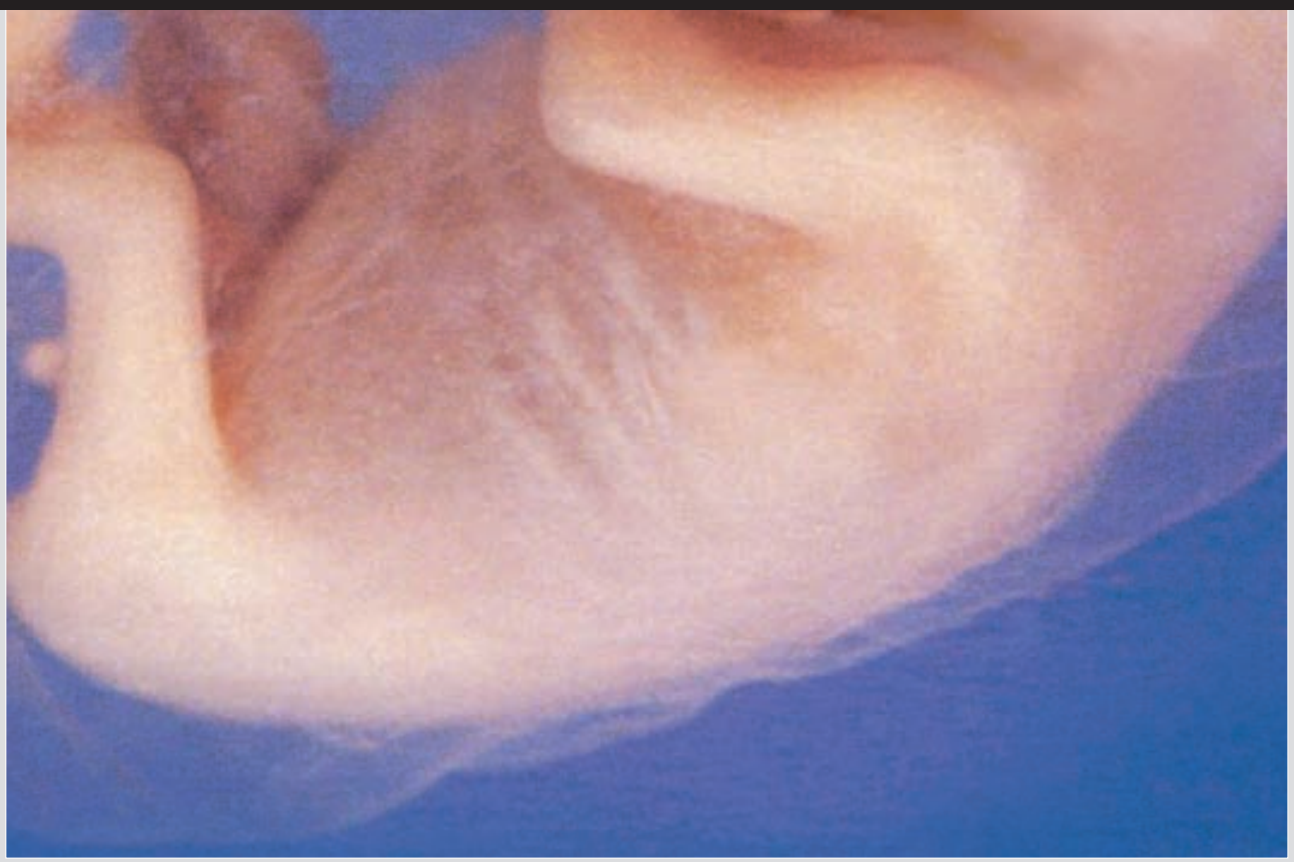
2. In the absence of the explicit exclusion of pre-implanted embryos from the legal definition of “the unborn”, logic dictates that the words include all unborn from fertilisation.

3. Therefore, the correct way forward is for the meaning of “the unborn” in the Constitution to be clarified so as specifically to include all the unborn from the moment of fertilisation. Furthermore, in light of the questions raised in the CAHR *Report* as to whether certain embryos formed outside the womb warrant legal protection at all, it also should be clarified that the unborn covered by Article 40.3.3° include all embryos howsoever formed.

HUMAN CLONING

"NO MAN HAS A SOUL. YOU *ARE* A SOUL. YOU HAVE A BODY."

CS Lewis



WHY HUMAN LIFE DESERVES OUR RESPECT

Introducing Dolly

In 1996 Ian Wilmut announced the birth of the world's first mammalian clone: Dolly the sheep. Six years later Dolly died prematurely following progressive lung disease and other complications.[1] In 2002 Brigette Boisselier announced that the first human cloned baby, allegedly a girl named Eve, had been born.[2] After initial hysteria, this announcement was later declared a hoax.

In May 2005 scientists in South Korea reported that they had successfully cloned 12 human embryos and had extracted stem cells from them.[3] The clones were formed using cells from people suffering from various diseases and these clones, it was anticipated, would be used to treat those diseases. However, Professor Hwang Woo-suk, the lead researcher in the South Korean project, has warned people not to expect clinical applications in the near future.[4]

Reproductive and Therapeutic Cloning

Since Dolly the sheep was born, the topic and practice of human cloning has been gaining much attention. Two types of human cloning are generally discussed:

o **Reproductive cloning** is human cloning undertaken for the purpose of bringing a cloned baby to birth.

o **Therapeutic cloning** involves the cloning of human embryos for use in medical research. Therapeutic cloning is sometimes referred to as "regenerative medicine".

The distinction between the two is spurious as the terms do not describe two different types of procedures. The technique used in therapeutic cloning is the very same as the technique used in reproductive cloning, as both result in a cloned human embryo. Therefore, both techniques are, in fact, reproductive.

The only difference is what is done with the embryo after he/she has been formed. Where reproductive cloning is undertaken, the cloned embryo is implanted in the uterus of a woman, where he/she is allowed to grow and be born. With therapeutic cloning, the newly formed human life is only permitted to grow until th embryonic stage, at which point stem cells are extracted, causing the death of the embryo.

How Does Cloning Work?

Cloning is performed by a procedure known as "Somatic Cell Nuclear Transfer" (SCNT), the type of cloning that brought Dolly the sheep into being. SCNT involves removing the nucleus of a mature human ovum and replacing it with the nucleus of a somatic (non-sex) cell from the person who is to be cloned. Introducing this nucleus means that the genetically modified human ovum now has its full quota of 46 chromosomes and is stimulated by an electrical current to cause it to develop in the same way as a naturally-conceived embryo. (In a natural conception, the meeting of the human sperm and ovum brings together 23 chromosomes from each parent to bring a new life into being).

Theoretically, if this embryo were successfully implanted in the womb of a woman the result would be a born cloned baby. Also, theoretically, scientists propose that, because the stem cells extracted from the embryo will be genetically identical to that of the donor of the cells, they can be used in that donor to treat a disease without the fear of rejection from the donor's body.[5]

The Cloned Human Embryo

Some proponents of human cloning and embryonic stem cell research suggest that the human life created by SCNT is not a human embryo, but a mere collection of cells that they sometimes refer to as a "pre-embryo". However, the US President's Council on Bioethics - a panel of experts established by President George Bush in 2001 - unanimously agreed that the life brought into being by SCNT is in fact "a cloned human embryo".[6] Scientists also agree that the SCNT procedure does not produce stem cells *per se*. If successful, it produces cloned human embryos, from whom stem cells could be extracted.[7] These are embryonic stem cells and, by definition, must come from an embryo. It is vital that we make the necessary difference between mere stem cells and a human embryo. While a stem cell is just a cell, and can come from a human being at any stage of his/her life, an embryo is a distinct individual human life at his/her earliest stage of development. A stem cell is not capable of any independent life-form; an embryo is an independent life-form who will continue to grow into a child and eventually be born.

Ethical problems with Therapeutic Cloning

While many opinion polls show that most people oppose the cloning of human life[8] and while the UN has approved a ban on cloning,[9] some countries including the UK and China, explicitly allow so-called therapeutic cloning for medical research purposes. This situation is hypocritical, and uses false distinctions to appease public opinion. If we have decided that it is unethical to produce a cloned baby through reproductive cloning, then how can it be ethical to produce a cloned human embryo, knowing full well that he/she is destined to be destroyed?

This is, of course, one of the major problems with therapeutic cloning. Whether one accords the human embryo full human status or not, one would have to be concerned at his/her assured destruction after formation, and appalled at the blatant commercial use of life proposed by the biotech companies. In the world of biotechnology, cloned human beings are mere commodities, products to be strip-mined and destroyed for their stem cells. Of course, an obvious truth is being denied - if embryos, cloned or otherwise, are not human, how could human stem cells be extracted from them?

Other Problems with Therapeutic Cloning

There are, however, many other problems with therapeutic cloning, one of those being the vast number of ova required in order to facilitate this process. One Dutch medical journal writes that "as this type of cloning has a very low efficiency, a large number of donor oocytes (eggs) is required." The author continues, "due to this array of technical problems the question remains as to whether therapeutic cloning will become feasible in the near future."[10]

David Prentice, one of the world's most knowledgeable scientists on biotechnological issues, examined the amount of ova that would be required to try and treat the 16 million diabetes sufferers in the US using therapeutic cloning. Prentice discovered that it would take 800 million ova to provide therapies, that may not even be successful, for all of these people,[11] leading some of the most enthusiastic proponents of therapeutic cloning to conclude that it "will be too expensive and cumbersome for regular clinical use."[12] Another researcher, James Thomson, who was the first person to isolate human embryonic stem cells, has written that "the poor availability of human oocytes, the low efficiency of the nuclear transfer procedure and the long population-doubling time of human embryonic stem cells make it difficult to envision therapeutic cloning becoming a routine clinical procedure."[13]

A truly revolting "solution" to the problem posed by the lack of ova has been proposed by some scientists who wish to use the ovaries of female aborted babies to develop ova cells. This may sound like a crazy fantasy, but Dutch and Israeli researchers are already experimenting with the ovaries of second and third trimester aborted baby girls to see if they could become a source of ova for use in fertility and other treatments.[14] Not only does this chilling research open up the macabre possibility of an aborted baby girl becoming a mother, it could result also in these unborn babies becoming commodities where they are killed through abortion just to harvest their ova.

Inefficiencies in Therapeutic Cloning

"Low efficiency" is a term that crops up in much of the research associated with therapeutic cloning. In an article published by Peter Mombaerts, a scientist who has spent years trying to perfect therapeutic cloning in mice, the author wrote that, "the efficiency of SCNT, or perhaps better, the lack of efficiency thereof, is remarkably consistent."[15] And Mombaerts isn't the only pro-cloning researcher to have finally seen the light with regard to therapeutic cloning. According to the editor of the journal *Nature*, "enthusiasm for therapeutic cloning was initially high. So, to the casual observer, it may come as a surprise that many experts do not now expect therapeutic cloning to have a large clinical impact."[16] Other senior stem cell biologists have warned that "a dose of reality needs to be injected into the excitement surrounding therapeutic cloning."[17]

Alternatives to Therapeutic Cloning

On the flip side, new evidence is also emerging which suggests that new developments have overtaken therapeutic cloning in the treatment of disease. Leading stem cell researcher Alan Trounson has abandoned his call for therapeutic cloning, saying scientific breakthroughs now mean

there is no need for the controversial technique. He told the Australian newspaper, *The Age,* that "in my view there are at least three or four other alternatives that are more attractive already." Professor Trounson concluded that "New techniques, including those being developed in Australia, Britain and Japan, offered better options."[18] Appendix II to our report discusses these new and successful techniques.

What History Tells Us

Many countries have banned therapeutic cloning because they fear it may one day result in reproductive cloning - cloned babies being born. This is dubbed the "slippery slope" argument and although it is criticised by cloning advocates, it is not without precedent. One needs only to look at the history of IVF treatment to realise how easily biotechnology can get carried away. Since Louise Brown, the first IVF baby, was born in 1978, there have been over 1 million babies born through IVF.[19] The procedure was morally controversial when it was first developed. People worried about the health concerns, and that society would be slow to place reasonable limits on IVF, causing this technology to change our views about the worth of the human embryo and our respect for early human life. Others dismissed these worries as being paranoid, and so IVF was approved. In 1980 when IVF was breaking news Ellen Goodman, a newspaper columnist with *The Boston Globe,* wrote: "A fear of many protesting the opening of this (IVF) clinic is that doctors there will fertilize a myriad of ova and discard the 'extras' and the abnormal, as if they were no more meaningful than a dish of caviar. But this fear seems largely unwarranted."[20] With "excess" human embryos being routinely discarded after IVF treatment, it seems people had a right to be concerned. In the same way we should now be concerned about human cloning.

Despite assurances that there are limits beyond which we shall not go, we have learned from the past that limits are breached once the first step is taken. And the first step towards actually bringing a cloned child to birth is so-called human therapeutic cloning, which is unethical and immoral in itself. So in order to ensure that cloning to produce children does not take place, must cloning for research purposes be prohibited? The answer is, quite frankly, and absolutely, yes.

SUMMARY

1. Two types of human cloning are generally discussed.

- **Reproductive cloning** involves the cloning of human embryos for the purpose of bringing a cloned baby to birth
- **Therapeutic cloning** involves the cloning of human embryos for use in medical research. The human embryo is always killed in the process.

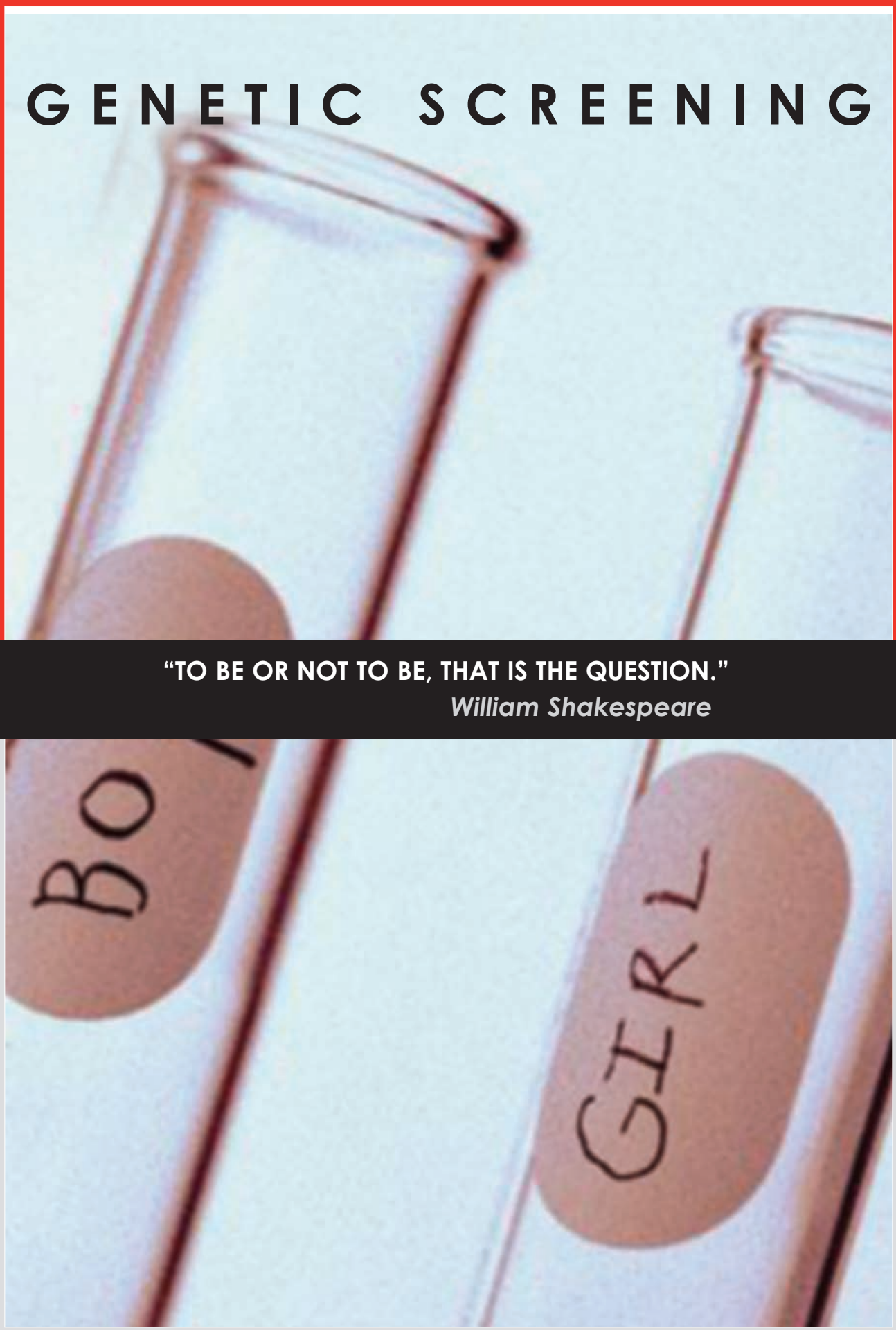
2. The techniques used to produce a human embryo for reproductive and therapeutic cloning are exactly the same. The only difference is in what happens to that embryo after fertilisation. With reproductive cloning, the cloned embryo is allowed to grow and be born. With therapeutic cloning, the new life is permitted to grow only until embryonic stage, when stem cells are extracted, causing the death of the embryo.

3. A cloned embryo is formed in a process that attempts to imitate natural conception. The nucleus of a human ovum cell is replaced with the nucleus from the cell of a person being cloned. The ovum is then stimulated and an embryo develops.

4. Proponents of therapeutic cloning argue that since the embryo thus formed is a clone of the patient who requires stem cells for treatment, the stem cell therapy will be more successful. This theory has been weakened by successive failures to develop therapies from embryonic stem cells, and weakened also by the more successful use of adult stem cells.

5. Cloning is unethical and immoral, often involves the deliberate destruction of human life, and should be banned.

GENETIC SCREENING



"TO BE OR NOT TO BE, THAT IS THE QUESTION."
William Shakespeare

WHY HUMAN LIFE DESERVES OUR RESPECT

Forming Perfect People?

In 1988 Joseph Fletcher, author of *The Ethics of Genetic Control: Ending Reproductive Roulette*, wrote that "there is no such thing as a right to bring a crippled child into the world." He continued that "if we choose family size, we should also choose family health…if the State is morally justified in repelling an unwelcome invader, why shouldn't the family be protected from an idiot or terribly diseased sibling?"[1] Fletcher was in fact so eager for scientists to have the ability to create "superior people" that he even devised his own Latin term to describe his obsession: *Homoautofabricus.*[2] While his philosophy of radical eugenics for the disabled caused outrage, Fletcher's ideology is today being embraced by modern scientists and is being routinely carried out in the form of Pre-Implantation Genetic Diagnosis (PGD).

PGD Explained

Pre-Implantation Genetic Diagnosis is a method used to examine the genes of human embryos formed by IVF technology. After being formed by IVF, a biopsy is carried out to remove a cell from the developing embryo. The DNA in this cell is then tested for chromosomal abnormalities or genetic mutations.[3] If such a condition is detected, the embryo is destroyed. If not, the embryo may be implanted in a woman, and allowed to grow and develop and, eventually, be born. PGD is most frequently used for people who have a family history of genetic disabilities, including cystic fibrosis, Huntington's Disease and Down's Syndrome.

Ethical and Moral Problems with PGD

Like many other experiments or research techniques that involve human embryos, the greatest concern with PGD is that it will, without doubt, involve the destruction of many early human lives. Humans begin life at the moment of fertilisation.[4] From that point on, human beings are entitled to the respect proper to their human nature, to protection from harm and to rights appropriate to their stage of development. PGD fails to respect the human value of the embryos examined in the laboratory, because the aim of PGD is to destroy those human lives found to have "undesirable" genes.

This procedure is completely incompatible with a respect for the right to life, because it entails destroying those human beings who do not measure up to an arbitrary measure of desirability. It is not possible to have respect for a human individual one is prepared to destroy if that individual does not measure up to a particular specification. No one has the right to excise an imperfect child, as if that child were no more than a tumour.

Other Problems with PGD

But, as Dr Jeffery Botkin commented in *The Permanente Journal*: "the ethical complexity of PGD goes well beyond right to life issues for the embryos."[5] PGD is by no means a risk-free procedure, and is still considered experimental. A negative aspect of PGD is the fact that the procedure can damage the embryo that is to be implanted, resulting in birth defects later on in that person's life. As already discussed in Chapter 1 of our report, embryos formed through IVF run serious risks of birth defects. PGD exposes the embryo, who has already undergone IVF, to an additional risk. This risk arises from the exposure of the embryo to chemicals and lasers and physical abrasions involved in the extraction of the cells from the embryo to perform the diagnosis.[6]

Also, with the PGD technique the embryo is biopsied by removal of one or two cells, and that reduces the embryo in size by up to 25%. There is a concern then that this could result in reduced foetal size, something associated with long-term health problems. The Barker hypothesis suggests that several major diseases of later life, including coronary heart disease, hypertension and diabetes, originate from impaired growth and development in the womb.[7] It is suggested that these diseases may be caused by a stimulus or abuse at a critical, sensitive, period of early life, an abuse having permanent effects on structure and physiology. In other words PGD causes changes to an individual in early life which can result in defects and problems to that individual in adulthood.

Destruction is Not Prevention

One of the commonest arguments the proponents of PGD use is that it is better to discard those embryos that have disabling genetic conditions than to allow those children to be born with such a condition. This notion is, in fact, being promoted at an alarming rate.

Bob Edwards, an embryologist and IVF pioneer, wrote in *The Sunday Times*: "Soon it will be a sin for parents to have a child that carries the heavy burden of genetic disease. We are entering a world where we have to consider the quality of our children."[8] This suggestion that children with disabling conditions are of bad quality will appal most Irish people, and can only be disturbing for those people who are currently living with a disability.

Adrienne Asch, Canadian academic and disability rights activist, sheds some light on the subject in a recent collection of essays, *Prenatal Testing and Disability Rights*: "A decision to abort based on the fact that the child is going to have specific individual characteristics such as mental retardation, or in the case of cystic fibrosis - a build up of mucus in the lungs - says that those characteristics take precedence over living itself, that they are so important and so negative, that they overpower any positive qualities there might be in being alive."[9] It is often suggested that PGD and pre-natal diagnosis will "prevent" disability. This is simply not true. PGD facilitates the destruction of human individuals found to have a disability before they are given a chance to be born. This is a form of fatal discrimination, and a denial of the fundamental right to life all human beings share. It is also highly offensive to people living with a disability, who realise that had this technology been available before their birth, they too would have been destroyed in the name of "preventing disability". One would also have to consider the reason behind the promotion of pre-natal diagnosis and selective implantation for disabled individuals. As Wesley Smith, author of *A Consumer's Guide to a Brave New World,* points out: "funding PGD and screening may be seen as having economic benefits for the community because it is cheaper than providing adequate services for people with disabilities."[10]

Some people argue that PGD is preferable to pre-natal screening leading to abortion of an unborn child who has a genetic condition. This argument is fundamentally flawed. Both PGD and pre-natal screening aim to detect disabled individuals so that they can be destroyed. With PGD these individuals are discarded at the embryonic stage, and with pre-natal screening they are killed through abortion at a later stage of pregnancy. The two kinds of diagnosis are essentially the same, the only difference being the age at which the disability is detected and the disabled individual destroyed.

Blue or Pink?

PGD is also used to facilitate sex selection, whereby parents can choose the gender of their children by examining their genes when they are at the embryonic stage of development. After the genes of the embryos are examined, the parents may wish to discard all the boys and implant just the girls, or vice versa. Sex selection is in fact becoming increasingly common via sperm sorting, embryo selection-destruction and abortion.[11] In fact, in India and China the natural balance between males and females has been disturbed completely because so many prospective parents destroy girls and try again for boys. Worldwide, there are estimated to be 100 million missing women as the result of sex selection.[12] Sex selection is the exercise of sexism at the most profound level, choosing who gets born and which types of lives are acceptable, and it raises serious ethical concerns. In the US a Presidential commission was set up to consider sex selection. This team of experts concluded that sex selection was "morally suspect". They gave a number of reasons for this judgement.

- First, such a practice was "an expression of sex prejudice".
- Second, it was incompatible with psychological studies that found that the parent-child relationship depends upon "the attitude of virtually unconditional acceptance".
- Third, sex selection treated the child "as an artefact and the reproductive process as a chance to design and produce human beings according to parental standards of excellence" - an attitude that the commission condemned.[13]

The Slippery Slope

A slippery slope also exists with PGD. The Nuffield Council of Bioethics, in its 1993 report *Genetic Screening: Ethical Issues*, predicted that the "potential of eugenic misuse of genetic testing will increase as genetic technologies develop."[14] If we allow a couple to screen and destroy their embryos for genetic disabilities, then why shouldn't we allow a couple to

discard the embryos for any other traits that are deemed “undesirable” by the parents, leading to the formation of what are commonly referred to as “designer babies”? What is being suggested here is that, if we accept or allow PGD, it will be impossible to oppose “choice” of any other characteristics, such as appearance, height, intelligence etc.. The door to “designer babies” will not have been opened just a crack, but will have been thrown wide open.

American bioethicist Art Caplan, speaking on MSNBC news station, asked the queston, “what will happen when testing extends to height, eye colour, muscular strength, hair colour and other traits that are highly determined by our genes?”[15] Even the genetic engineer Gregory Stock, admits in the book *Redesigning Humans* that, once unleashed, “these technologies will be virtually impossible to control.”[16] The solution to this is simple: the best way to stop eugenic human germ-line alterations and manipulation of the human genome, is to prevent the technology from ever being used in human beings. And this can be achieved only by placing a complete ban on Pre-Implantation Genetic Diagnosis.

Conclusion

The very act of selecting our children through PGD creates an ethical problem. By choosing the characteristics of our children we change the relationship between us and them: choosing results in treating them as just so many other consumer commodities or objects. The relationship becomes more like one between designer and object than between parent and child. In one sense, even if science can’t yet - and may never - allow the would-be genetic enhancers to select all of the desirable traits that they want, their ideology has already damaged our perception of children, and what it means to be a parent. Childbearing and rearing seems increasingly to be viewed as being primarily about satisfying our desires, working toward our fulfilment through our children's lives. We are deemed by the bioethics elite to have a “procreator's right” to design our own children to achieve these goals. The Council for Responsible Genetics summed it up succinctly when they said: “All people have the right to have been conceived, gestated and born without genetic manipulation.”[17]

SUMMARY

1. Pre-Implantation Genetic Diagnosis is a method used to examine the genes of human embryos formed by IVF technology. The embryo's DNA is then tested for chromosomal abnormalities or genetic mutations, and if such a condition is detected, the embryo is destroyed. If not, the embryo may be implanted in a woman and allowed to grow and develop and, eventually, to be born.

2. A eugenic ideology is at the root of PGD: some scientists believe that we should destroy all less than “perfect” human beings before they are born.

3. PGD does not prevent disabilities - rather it aims to destroy any embryo with undesirable genetic conditions. It is incompatible with respect for human life, and increases hostility towards people with disabilities.

4. PGD, especially when combined with IVF procedures, can damage the embryo who is to be implanted resulting in birth defects later on in the person's life.

5. The formation of “designer babies” is the next logical step after allowing screening and destruction of embryos for genetic disabilities. If we accept PGD, it will be impossible to oppose “choice” of any other characteristics, such as appearance, height, intelligence etc.. The door will not have been opened just a crack, but will have been thrown wide open.

6. The very act of selecting our children through PGD creates an ethical problem. By choosing the characteristics of our children we change the relationship between ourselves and them: choosing results in treating a child as just another consumer commodity or object. The relationship becomes more like one between designer and object, rather than one between parent and child.

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APPENDIX I

NaProTechnology - An Ethical Alternative to IVF

Infertility is defined in the medical world as the inability to achieve a pregnancy after at least one year of trying. It is a significant problem for many couples around the world. In the United States up to 1 in 5 couples experience difficulty in conceiving, and in Europe infertility affects 1 in 6 couples. The most common causes of infertility are: failure to ovulate, the age of the woman, and a drop in the production of male sperm. These, and other factors, such as Sexually Transmitted Infections, contribute to a couple not being able to have a baby.

Artificial Reproductive Technology (ART) is a term to describe the methods used in helping couples become pregnant. These methods are *In Vitro* Fertilisation (IVF), Intra-Cytoplasmic Sperm Injection (ICSI), and Gamete Intra Fallopian Transfer (GIFT). However, these are not the only techniques available in helping couples who are having difficulty conceiving.

Natural Procreative Technology, or the abbreviated NaProTechnology (NPT) is a new, safe, and effective means of treating infertility that can avoid the perceived need for ART in many cases. NaProTechnology is a couple-centered, disease-based approach to investigate, diagnose, and treat infertility. This technology is called “natural” because it refers to the method of conception through a natural act of intercourse as opposed to any artificial intervention which replaces intercourse. Studies conducted in the area of NaProTechnology, and the clinical experience of those who practise it, show great promise for this method.

NaProTechnology was created by Consultant Obstetrician Dr Thomas Hilgers in the United States, over a period of 20 years. Training programmes have been offered to doctors since 1991 and this technology has been available to Irish patients since 1998. NaProTechnology allows a closer evaluation of fertility, and frequently leads to the detection of abnormalities that may have been previously overlooked. It offers an approach to the investigation and management of infertility, is considerably more successful than IVF, and is minimally invasive.

NaProTechnology treatment is offered only if some abnormality is identified. The key to the considerable success of this method lies in the ability to establish a diagnosis through a detailed study of a woman's menstrual cycle, and then using this information to perform a targeted evaluation of her cycle, through hormone tests, ultrasound scanning etc.. It is unusual for this evaluation process to conclude with a diagnosis of “unexplained infertility”.

Before treatment with NaProTechnology begins, women are taught to observe certain biological signs to monitor their own gynaecological health, and to confidently identify times of fertility and infertility. These signs are then charted daily to give a clear picture of the woman's individual cycle. Medical consultants can then use the fertility charts as the basis for further investigations, if needed. Hormone levels can be recorded also using the data from the couple's fertility chart. This leads to a more precise and interpretable evaluation of abnormalities such as hormonal deficiencies, various ovulation defects etc., than is otherwise possible.

NaProTechnology treatment aims to restore fertility naturally, by identifying, and then correcting, the underlying causes of the couple’s infertility, rather than bypassing them, as in the case of artificial technologies such as IVF. In addition to maximising the chances of conceiving naturally while on treatment, NaProTechnology is very successful in preventing miscarriage. The treatment plan can involve a number of different approaches to solving the problem. These include:

- The use of natural hormones and other medications to correct any hormonal disturbances or

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ovulation abnormality

o The use of medications, if necessary, to correct any other abnormalities e.g. cervical mucus deficiency, glandular deficiencies etc., to restore normal physiological function, and thereby enhance fertility

o Referral to a gynaecologist, if necessary, to investigate surgically for physical abnormalities (e.g. blocked Fallopian tubes, endometriosis, adhesions) and to have these conditions surgically treated

o Medical treatment for male infertility

o Influences of lifestyle and other factors on the couple's fertility are regularly monitored and appropriate advice given.

NaProTechnology holds a number of significant advantages over other methods of Assisted Procreative Technology, including IVF. Significantly, there is absolutely no loss of human life with this technology. This is not the same for IVF, where, for every single child that is born through the procedure, an average of 19 embryos will die. Because the formation of human life in such an unnatural manner is avoided, there can never be any "excess" or "spare" embryos formed, thus eliminating the unethical practice of embryo storage and future destruction. With NPT, babies are conceived and born in the natural manner, and so the other complications associated with IVF (see Chapter 1) are also minimised or eliminated.

The success rates for NaProTechnology as opposed to IVF appear to be remarkably high. In one NPT centre in Ireland a study was carried out on 95 patients who entered the NaProTechnology programme after at least one failed ART attempt. Of these patients 74 had at least one live birth or ongoing pregnancy, representing a success rate of 77%. This is more than twice the take-home-baby rate for IVF, even when using the most impressive rates from IVF. Many couples turn to NPT after unsuccessful attempts at IVF. Even Professor Robert Winston, the IVF pioneer, writes in his book *The IVF Revolution: The Definitive Guide to Assisted Reproductive Techniques* (Vermilion: 1998) that "more than half of the women referred to IVF clinics would be better treated by alternatives." Furthermore, the authors of *Infertility in Practice,* Adam Balen, Howard Jacobs, (Churchill Livingstone: 1997) state that in their opinion "IVF is sometimes embarked upon before all other treatment modalities have been exhausted and…the notion that IVF is the high-tech modern answer to every couple's infertility is erroneous."

Another striking difference with NPT is that, once a couple have had a successful pregnancy, their chances of subsequent successful pregnancies are excellent. NPT is a corrective treatment which restores normal procreative function. Having identified and corrected the abnormality which previously prevented a successful pregnancy, future pregnancies occur quite easily in most cases.

Evidence is accumulating in favour of NPT as the method of choice in promoting fertility awareness, maintaining gynaecological health, and treating couples with infertility. It is an uncomplicated common-sense approach to understanding and treating nearly every cause of infertility. We have mentioned here just how effective NPT can be, even with previous failed attempts at IVF. A problem in medicine today is that some doctors often adopt the high-tech, invasive, approaches without investigating the underlying causes, and simpler treatment options for infertility. The pain and distress for women of being unable to conceive must never be underestimated. The medical profession have a duty to aid such women, but in their desire to employ new treatments, they must not neglect thorough investigations of their patient.

APPENDIX II

Adult Stem Cells - An Ethical Alternative to Embryo Research

When stem cell research first came to public attention in the late 1990s, most of the non-embryonic research successes had not yet been published. At the time, researchers told people that the best source of cures would be embryonic stem cells, and that nobody should value a tiny embryo above a sick child. The media too played its part in promoting embryonic stem cells as the body's repair kit, and helped to create a belief that these cells could be used to cure a range of diseases such as Parkinson's, Alzheimer's and spinal cord injuries. Now, the growing weight of scientific evidence is beginning to discount this idea that embryonic stem cells are the answer, and former supporters of embryonic stem cell research are now favouring adult stem cells as the method of choice for treating degenerative diseases.

Biotech optimist Michael Fumento, author of the book *BioEvolution*, accurately referred to adult stem cells as "stupendous stem cells".[1] An adult stem cell is an undifferentiated cell found among differentiated cells in a tissue or organ. It can renew itself, and can differentiate to yield the major specialised cell types of the tissue or organ.[2] Adult stem cells have been isolated from numerous tissues, umbilical cord, and other non-embryonic sources, and have demonstrated surprising ability to transform into other tissue and cell types and to repair damaged tissues. Adult stem cells have received intense scrutiny over the past few years due to their previously unknown cures for certain diseases. The key questions regarding adult stem cells are:

(i) their tissue source of origin
(ii) their ability to form other cell or tissue types to treat diseases
(iii) and their effects on other tissues and organs.

Adult stem cells have been successful in treating up to 65 different conditions, while not a single successful treatment has come from the use of embryonic stem cells.[3] For this reason, most biotech companies are not engaging in embryonic stem cell research, and not because of ethical problems, but because adult stem cells seem more likely to provide effective medical treatments to suffering patients.

The term "adult stem cell" is in fact confusing, because these cells are present even in infants, and similar cells exist in the umbilical cord and placenta. Adult stem cells have in fact been discovered in the following tissues: bone marrow, muscle, liver, pancreas, cornea (of the eye), mammary glands, salivary glands, skin, heart, cartilage, teeth, adipose tissue (fat), placenta, and umbilical cord blood. Adult stem cells have been successfully isolated from all of these, and other tissues, and have been shown to have various therapeutic applications to human patients, and animal experiments.[4]

It is not within the remit of our report to go into every single successful therapeutic use of adult stem cells; suffice it to say that there have been up to 65 different applications documented. Here we shall mention just a few examples to give you an idea of the types of applications that have been achieved using adult stem cells:

o Stem cells from bone marrow have been found to repair damaged muscle. The researchers involved in one such study on this application believe that the results are promising for the future use of adult stem cells in the treatment of neuromuscular diseases such as muscular dystrophy.[5]

o In a study published in the May 2003 edition of *Nature Medicine* researchers found that five people suffering from Parkinson's disease, who received injections of adult stem cells, experienced significant improvement in their ability to perform daily activities. Three of the patients regained their sense of taste and smell.[6]

o *The Times* newspaper reported that scientists in Canada turned adult skin cells into the building blocks of brain cells - opening the way for their use in new therapies for incurable diseases such as Alzheimer's.[7]

o A study in the *Journal of the American College of Cardiology* reported that adult stem cells taken from a patient's own muscles repaired damage to the heart after a heart attack.[8]

o Researchers have successfully restored some eye function by extracting stem cells from human eyes, and transplanting them into mice. The researchers hope that the technique could provide a cure for blindness within five years.[9]

o A report in *Nature Science Update* stated that genetically-modified adult stem cells that were implanted into the brains of eight Alzheimer's patients in an early human trial, appeared to slow the mental decline by half. According to the researchers: "if these effects are borne out in larger, controlled trials, this could be a significant advance in therapies for Alzheimer's disease."[10]

Umbilical cord blood is another example of a source of adult stem cells, and its potential is universally recognised. Stem cells found in umbilical cord blood are proving so useful in regenerative medicine that many parents are now choosing to store the cells of their children's umbilical cords, and many countries are now establishing national umbilical cord blood stem cell banks.[11] For example, stem cells from umbilical cord blood have been very successful in the treatment of sickle cell anaemia.[12] In one published study, 36 out of 44 children remained disease-free two years after treatment with umbilical cord blood cells.[13]

Human cord blood cells have also been shown to be similar to bone marrow stem cells in terms of their potential to differentiate into other tissue types. These cells have turned into neuron-like cells, which have been successful in treating strokes in animals.[14] Several reports have also noted the production of liver cells from human cord blood cells.[15]

These are just some examples of the present therapeutic benefits of adult stem cells. These cells are currently undergoing numerous clinical trials and are being used for the treatment of cancers, auto-immune diseases, anaemias, bone and cartilage deformities, strokes and skin grafts.[16] An in-depth report on the range of therapeutic benefits of adult stem cells, along with a complete list of every condition that has been treated using these cells are available online.[17,18] The benefits of adult stem cell research now seem indisputable, and with the expectation that many more potential applications will be seen, adult stem cells look to be the source of effective treatments and cures in the years to come.

Those who advocate the destruction of the human embryo in order to extract its stem cells for experimentation will often try to downplay the therapeutic successes of adult stem cells. The commonest argument used against adult stem cells is that they are not pluripotent, meaning that they are unable to transform into every tissue type in the human body, as embryonic stem cells are.

This is not entirely true, however, and as various clinical trials and studies continue, we are realising that the pluripotent nature of adult stem cells is far greater than was previously considered. Our report has already mentioned that scientists have turned skin cells into brain cells, and umbilical cord stem cells into liver cells, and there are many more examples of this type of research. Human stem cells from bone marrow have been shown to differentiate into various cell types including neuronal cells[19,20] as well as cartilage, bone and fat cells.[21]

APPENDIX II (CONT'D)

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An animal experiment using bone marrow cells also revealed that these cells transformed into cardiac and skeletal muscle cells.[22] Bone-marrow-derived stem cells have also been able to form neuronal tissues,[23] and a single adult bone marrow stem cell can contribute to tissues as diverse as liver, skin, and digestive tract.[24] Neuronal stem cells can produce other tissues including blood and muscle,[25] liver stem cells can render pancreatic cells,[26] cord blood cells can render liver cells and brain cells.[27] The list of adult stem cells that have the ability to transform into other cells continues to grow, and it is not possible to discuss every one in our report; again a very in-depth report, which details a lot of studies conducted in this area, is available online.[28] Suffice it to say here that adult stem cells do in fact exhibit pluripotent abilities, and more and more of these abilities are being realised and developed.

This may very well be the reason why many embryonic stem cell researchers are now turning to adult stem cells to develop cures and treatments. In August 2005, *NewScientist* reported that scientists had found umbilical cord blood cells that were extremely versatile, and capable of transforming into other tissues of the human body. The researchers referred to these stem cells as "embryonic-like" and said that they had "found a unique group of cells that bring together the essential qualities of both types of stem cells for the first time."[29]

Regardless of whether embryonic stem cells are more pluripotent or not, what is important in this debate is to review the evidence. Medically and scientifically, adult stem cells appear to be far more efficient than embryonic stem cells, as their therapeutic applications have been tried and tested, and have been proved to work. One of the main reasons they succeed where embryonic stem cells do not, is that adult stem cells do not have the problem of immune rejection by the patient that embryonic cells do, and that is a far bigger advantage than pluripotency. Adult stem cells generally come from the patient's own body, and therefore are genetically identical to the patient's own body cells. This eliminates the danger of immune rejection by the patient.

Ethically, the use of adult stem cells is acceptable; the use of embryonic stem cells isn't. Treatment using adult stem cells does not necessitate the destruction of human beings. It is entirely and ethically legitimate to use adult stem cells, including those derived from other non-embryonic sources, such as umbilical cord blood, and placenta, for the treatment of diseases and other therapeutic applications. The authors of our report strongly suggest that resources be directed towards this area, so we can develop and expand the cures and treatments that are currently available. The bank of knowledge regarding adult stem cells has expanded greatly in just a few short years. Evidence from both animal studies and human clinical trials shows that they have significant capabilities for growth, repair, and regeneration of damaged cells and tissues in the body. These are the true "self-repair kit" for the human body. The potential of adult stem cells to impact medicine in this respect is enormous and should be fully developed.

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APPENDIX III

When does Human Life Begin? - A Review of the Evidence

The topic of when human life begins has been debated by civilisations throughout history. From Plato to Pope John Paul II, mankind has sought to determine when and how a human being comes into existence. Today, that question has been decided scientifically, yet some choose to question the evidence when promoting a particular agenda in relation to abortion, human cloning, embryonic stem cell research, assisted reproduction, and genetic testing. We believe that this important question is primarily a scientific one, and should be answered by human embryologists. This article focuses on the objective scientific facts and clarifies what the international consensus of human embryologists is with regard to this important scientific question.

To begin with, it is necessary to understand the basic facts of human embryology. Every kind of living organism has a specific number of chromosomes that are characteristic of every member of a species. For example, the characteristic number of chromosomes for a member of the human species is 46.[1] Every cell in a human being should possess this number, except for the sex cells (spermatozoon and ovum), which contain 23 chromosomes each. The sex cells need to contain half the number of chromosomes because these cells will fuse at fertilisation to create a live human being in the form of a single-cell human zygote with 46 chromosomes.[2] Fertilisation generally occurs in one of the Fallopian tubes of the mother. Afterwards the newly formed human being immediately produces specifically human proteins and enzymes, and genetically directs his or her own growth and development. In fact, it has been proved that this genetic growth and development are not directed by the mother, but by the embryo himself /herself.[3] After fertilisation, the embryo undergoes a series of divisions resulting in a mass of cells that will give rise eventually to every tissue in the body. These divisions are called mitotic divisions, and cause the embryo to grow bigger and bigger. Several of these developmental stages of the embryo are named, e.g., a morula (after 4 days), a blastocyst (5-7 days) and a bilaminar (after 2 weeks).[4]

Fertilisation is the launch-pad of human development. The pivotal moment in the growth and development of a human being is when 23 chromosomes from the father's spermatozoon join with 23 chromosomes from the mother's ovum to form a completely new and unique individual. The terms fertilisation and conception have had the same meaning since the terms first came into use in the 19th century, and have been used interchangeably since that time. However, in the 1960s the U.S. Food and Drug Administration sought to make conception synonymous with implantation, a spurious distinction which was not accepted worldwide. In fact, it is no longer accepted in the U.S. as the 1981 report of the U.S. Subcommittee on Separation of Powers to Senate Judiciary Committee remarked; *"Physicians, biologists, and other scientists agree that conception [they defined fertilization and conception to be the same] marks the beginning of the life of a human being - a being that is alive and is a member of the human species. There is overwhelming agreement on this point in countless medical, biological, and scientific writings."* In this report, we use the scientifically appropriate term, fertilisation, to denote the beginning of life.

This newly formed human life is biologically at least one individual. The embryologist Larsen says, "we begin our description of the developing human with the formation and differentiation of the male and female sex cells or gametes, which will unite at fertilisation to initiate the embryonic development of a new individual."[5] Also, the authors of *The Developing Human: Clinically Orientated Embryology* explain this process very well: "Human development is a continuous process that begins when an oocyte is fertilised by a sperm; this is the beginning of a new human being (i.e. an embryo)."[6] The authors continue, "human development begins at fertilisation with the joining of ovum and sperm, which form a single cell - a zygote. This highly specialised cell marks the beginning of each of us as a unique individual."[7]

Further evidence that human life begins at fertilisation was reported in an article published in the British science journal *Nature*, describing how the human body plan "starts being laid down immediately upon fertilisation." The authors state that: "Your world was shaped in the first 24 hours after conception. Where

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your head and feet would sprout, and which side would form your back and which your belly, were defined in the minutes and hours after sperm and ovum united."[8]

Dr Ward Kischer, Emeritus Professor of Anatomy at the University of Arizona, wrote in an article entitled *Let's Be Factual About The Human Embryo,* that: "the first thing learned in human embryology is that the life of the new individual being begins at fertilization." He continues, "we should respect a microscopic human embryo because at that time it is an integrated whole organism, just as the human is at every moment until death."[9] And textbook after textbook of human embryology agrees. In fact from researching the available material in books and journals to write this piece, we found an overwhelming scientific consensus favouring the view that human life begins at the moment of fertilisation.

An important consideration in this debate is to define what human life actually is, and how we come to the conclusion that an embryo is in fact a human being. There are three simple measures used to do this: The first one is to ask: is this being alive? Clearly the human embryo is alive, as he/she has all the characteristics of life. That is, he/she can produce his/her own cells and develop them into a specific pattern of maturity and function. Or more simply, the human embryo is not dead.

The second measure is to see whether this being is human. Again, with the human embryo, the answer is "yes". This is a unique being, distinguishable totally from any other living organism, completely human in all of his/her characteristics, including the 46 chromosomes, and can develop only into fully mature human(s) and nothing else. The final measure to define human life is to ask whether the being is complete. The answer is "yes" again. Nothing new needs to be added from the time of union of sperm and ovum than is already there from the beginning. All the embryo needs, to grow and develop, is time.

One of the commonest arguments made in favour of destroying embryos is that the human embryo is nothing more than a collection of cells, and should be treated in the same way we treat other human cells, such as a skin cell. This notion could not be further from the scientific truth. Biologically there is a fundamental distinction between an embryo and all other body cells. According to basic embryology, "a new, genetically distinct human organism is formed when the chromosomes of the male and female unite during fertilisation."[10] A body cell on the other hand is not a self-contained organism. To put it another way, each and every one of your body's cells is a microscopic piece of your body, but each cell is not you. When you were an embryo, however, that embryo was you. An embryo has a life of his/her own; he/she is not part of another organism. This is the critical difference between cells, or a collection of cells and a living organism.

Organisms are integrated creatures. Cells are mere parts of integrated creatures. Maureen Condic, Professor of Neurobiology at University of Utah, explains this: "As distinct from a group of cells, embryos are capable of growing, maturing, maintaining a physiological balance between various organ systems, adapting to changing circumstances, and repairing injury. Mere groups of human cells do nothing like this under any circumstances."[11] Biologically, therefore, it is quite evident that an embryo, is utterly distinct from a cell or group of cells.

Various political and ideological attempts have been made to redefine the point at which life begins, but all these have proved arbitrary and unjustified. Chief amongst these has been the use of the concept of the "pre-embryo", (often referred to as the "pre-implantation embryo"), and the idea that there is no precise moment but rather a gradual growth of a fertilised ovum into a human person. The phrase "pre-embryo" was actually invented, for political reasons only, by an Amphibian Embryologist by the name of Clifford Grobstein. It has no credible scientific justification, and is only intended to downgrade the moral status of the early human embryo, and applies to the embryo who "exists for the first two weeks after fertilisation."[12] The idea of the "pre-embryo" has been seized upon and used to justify experimenting on human embryos, and has proliferated in formal and informal discussions on matters such as abortion and

stem cell research. It has never had the sanction or sponsorship of a single human embryologist.[13]

This false distinction is used by scientists to justify the destruction of some human embryos. They would afford protection to an embryo in the womb, but deny it to other embryos so that they can be used for research and industrial purposes. Science tells us that, biologically, there is no such thing as a pre-embryo. Thus, the authors of *Human Embryology and Teratology* place the term "pre-embryo" in the category "Undesirable Term in Human Embryology", insisting that "embryo" is the scientifically accurate, hence preferable term. They explain: "The term 'pre-embryo' is not used here [in their book] for the following reasons: (1) it is ill-defined... (2) it is inaccurate… (3) it is unjustified... (4) it is equivocal because it may convey the erroneous idea that a new human organism is formed at only some considerable time after fertilisation; and (5) it was introduced in 1986 largely for public policy reasons."[14]

Some of the most senior figures in the field of medical science have testified to the fact that human life begins at the moment of fertilisation:

"After fertilization has taken place a new human being has come into being...[this] is no longer a matter of taste or opinion, it is not a metaphysical contention, it is plain experimental evidence...." -
Dr Jerome LeJeune, Professor of Genetics at the University of Descartes, Paris, discoverer of the chromosome pattern of Down's Syndrome, and Nobel Prize Winner

"Development begins at fertilization when a sperm fuses with an ovum to form a zygote; this cell is the beginning of a new human being."
Moore, Keith L., The Developing Human: Clinically Oriented Embryology, page 12, W.B. Saunders Co.,

"In that fraction of a second when the chromosomes form pairs, the sex of the new child will be determined, hereditary characteristics received from each parent will be set, and a new life will have begun."
Kaluger, G., and Kaluger, M., Human Development: The Span of Life, page 28-29, The C.V. Mosby Co.

"A new individual is created when the elements of a potent sperm merge with those of a fertile ovum."
Encyclopedia Britannica, "Pregnancy," page 968, 15th Edition, Chicago 1974.

To find the answer as to when human life begins one needs only to look in any respected embryology textbook. As our knowledge of human development becomes increasingly deeper, the scientific consensus that human life does in fact begin at fertilisation gains more and more weight. This fact has been confirmed and supported by leading medical professionals worldwide, and anyone who tries to prove otherwise is flying in the face of modern-day science.

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Appendix III

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13. C . Ward Kischer, *The Human Development Hoax: Time to Tell the Truth*, (Gold Leaf: 1995)
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APPENDIX IV

Recommendations from the CAHR *Report*, April 2005

The Commission on Assisted Human Reproduction (CAHR) was established in March 2000 by the then Minister for Health and Children Mr Micheál Martin. The Commission was charged with the responsibility of preparing a report on "the possible approaches to the regulation of all aspects of Assisted Human Reproduction and the social, ethical and legal factors to be taken into account in determining public policy in this area". There were 25 members on the CAHR, and their backgrounds ranged from medical, scientific, legal and political.

On Thursday, 6 February, 2003, the Commission held a public conference in the Dublin Castle Conference Centre and, through an advertisement in *The Irish Times* and other publications, invited members of the public to attend the conference. Many of those who attended felt that the conference panel was heavily weighted in favour of those who did not wish to protect the life of the embryonic human being. This sense of dissatisfaction was expressed in the national print media through articles and letters, and perhaps more significantly, it is recorded in many of the comments from the floor which appear in the Conference Transcript of the CAHR's public conference. In fact, that transcript shows that a large majority of contributions made by the public attending the conference argued for legal protection of human life from the moment of fertilisation. Of the 30 contributors from the floor, 21 opposed the deliberate destruction of human embryos, 6 contributors were neutral and only 3 regarded embryo destruction as ethically permissible.

The mindset of the CAHR was indicated not only by the panel, but by guest speakers, including the notorious Briton, Baroness Warnock, who stunned conference-goers when she declared that no respect should be afforded the human embryo since "you cannot respectfully pour something down the sink which is the fate of the embryo after it has been used for research, or if it is not going to be used for research or for anything else." Out of 5 guest speakers, 4 regarded the deliberate destruction of human embryos as ethically permissible, and only one did not. Out of 16 panel members, 13 regarded the deliberate destruction of human embryos as ethically permissible, and only one did not. The remaining 2 members expressed no opinion. The conference gave no consideration to the alternatives to IVF or embryonic stem cell research. Two years after that blatantly biased conference, the CAHR presented their *Report* to the current Minister for Health and Children, Tánaiste Mary Harney, in May 2005. The *Report* presented the Minister with 40 recommendations for regulation in the area of Assisted Human Reproduction and stem cell research. The majority of the recommendations favour the deliberate destruction of the child embryo.

Not all of the recommendations made are relevant to the discussion on the ethical aspects of AHR and stem cell research. Therefore we shall list only those recommendations that, if adopted, would undoubtedly make Ireland one of the most liberal countries in Europe with regard to unethical stem cell research and assisted reproductive technologies.

List of CAHR Recommendations:

Recommendation 2
National statistics on the outcome of AHR techniques in Ireland should be compiled and made available to the public.

Recommendation 3
Longitudinal studies of children born as a result of AHR should be established, in accordance with standard/ethical requirements and with the consent of the families, in order to facilitate long-term monitoring.

Recommendation 5
Superovulation should be allowed according to well established clinical protocols. Appropriate guidelines should be put in place by the regulatory body to govern superovulation and the harvesting of ova following ovarian stimulation.

Recommendation 7
Appropriate guidelines should be put in place by the regulatory body to govern the fertilisation of ova.

Recommendation 8
Appropriate guidelines should be put in place by the regulatory body to govern the number of embryos to be transferred in any one treatment cycle and when to transfer embryos.

APPENDIX IV (CONT'D)

FROM PREVIOUS PAGE

RECOMMENDATION 9
Appropriate guidelines should be put in place by the regulatory body to govern the freezing of excess healthy embryos.

RECOMMENDATION 10
Appropriate guidelines should be put in place by the regulatory body to govern the options available for excess frozen embryos. These would include voluntary donation of excess healthy embryos to other recipients, voluntary donation for research or allowing them to perish.

RECOMMENDATION 16
The embryo formed by IVF should not attract legal protection until placed in the human body, at which stage it would attract the same level of protection as the embryo formed in-vivo.

RECOMMENDATION 34
Embryo research, including embryonic stem cell research, for specific purposes only and under stringently controlled conditions, should be permitted on surplus embryos that are donated specifically for research. This should be permitted up to fourteen days following fertilisation.

RECOMMENDATION 36
Regenerative medicine should be permitted under regulation.

RECOMMENDATION 38
Preconception sex selection should be permitted only for the reliable prevention of serious sex linked disorders and not for social reasons.

RECOMMENDATION 40
Pre-implantation genetic diagnosis (PGD) should be allowed, under regulation, to reduce the risk of serious genetic disorders. PGD should also be allowed for tissue typing only for serious diseases that cannot otherwise be treated. Each licence issued for PGD should specify the proposed procedure. The regulatory body should oversee and monitor developments in PGD.

COMMENT ON RECOMMENDATION 8: *The above recommendations are in connection with the regulation of the practice of IVF in Ireland. No recommendations were made which would address the ethical alternatives to IVF. The CAHR did not investigate the risks that IVF holds for both mother and child. Please see Chapter 1 and Appendix I of our report in relation to these recommendations.*

COMMENT ON RECOMMENDATION 10: *The above recommendations allow for the freezing, and deliberate destruction of, human embryos that are deemed to be surplus to requirements. Please see Chapter 2 of our report for a detailed analysis of the enormous ethical problems created by embryo freezing.*

COMMENT ON RECOMMENDATION 16: *If the above recommendation were to be adopted, it would pave the way for a whole range of embryo abuses to take place in this country. Please see Chapter 4 of our report in connection with the legal status of the human embryo, and why he/she needs to be protected, starting from fertilisation.*

COMMENT ON RECOMMENDATION 34: *This recommendation explicitly allows for experimentation on human embryos. Embryo research destroys early human lives, and should not be permitted in law. Please see Chapter 3 of our report for a detailed explanation as to why embryo experimentation should not be allowed.*

COMMENT ON RECOMMENDATION 36: *The glossary in the* Report *of the CAHR explains that "Regenerative Medicine" is another name for "Therapeutic Cloning". Therapeutic cloning is just like reproductive cloning, the only difference being that with therapeutic cloning the cloned child is allowed live only to the embryonic stage of development. Therapeutic cloning is defined and discussed in Chapter 5 of our report.*

COMMENT ON RECOMMENDATION 40: *PGD allows couples to select only those embryos who have "perfect genes". It also allows for the deliberate destruction of certain human embryos found to have defective or imperfect genes. The* Report *of the CAHR does not define what the "serious genetic disorders" are, and could include such conditions as Down's Syndrome. Genetic selection has huge ethical implications; these are discussed in Chapter 6 of our report.*

APPENDIX V

Make Your Voice Heard - A Campaign Guide

Your role as an Irish citizen is absolutely crucial to the protection of unborn human life. **In making your voice heard you can ensure that Ireland's pro-life ethos is upheld and that unborn human life will be protected, starting from fertilisation.**

Here's what you must do to make a difference:

A: Send that Letter

1. A lobbying letter to An Taoiseach is enclosed with our report. We're asking you to put your name and address on the top of the letter, sign it at the bottom and post it to his office at the address given.
2. A similar letter to the Minister for Health is also enclosed. Again, we're asking you to put your name and address on the top of the letter, sign at the bottom and post it to her office at the address given.
3. Please send these letters TODAY. It is essential that pro-life voices are heard. **Your voice is crucial.**
4. If you have not received enclosures with our report, please call the Youth Defence office on (01) 8730463 and ask for copies of the lobbying letters today.

B: Get Others to Do the Same

1. Please make copies of the lobbying letters for your family, friends and neighbours. Ask them to sign and send this important pro-life message immediately.
2. We have sent our report to every parish in the country. If you would like copies of the lobbying letters for distribution after Mass please contact the Youth Defence office on (01) 8730463 and ask for as many copies as you need.
3. Please support your priest in undertaking this endeavour.

C: Make that Call

Having posted your lobbying letter, you can make a follow-up call in a couple of days. These lobbying phone calls will be a forceful reminder of the strength of Ireland's pro-life ethos.
Call the offices of An Taoiseach, Bertie Ahern on (01) 8374129 or (01) 6194020 / 4021 / 4043
and An Tánaiste, Minister for Health, Mary Harney on (01) 6354148 / 6711026
And say the following:

1. Introduce yourself and say you are calling regarding the recommendations of the Irish Commission on Assisted Human Reproduction (CAHR). Say you understand that An Taoiseach, Bertie Ahern, and An Tánaiste, Mary Harney, are considering those recommendations.
2. Say that you were horrified to learn that the CAHR support the use of human embryos in research, and that all human embryos must be given legal protection, starting from the moment of fertilisation.
3. Say that the CAHR's proposals would make Ireland one of the most liberal regimes in the world regarding destructive embryo research, and that this is contrary to Ireland's pro-life ethos. The Irish Medical Council opposes embryo research.
4. Say that Fianna Fáil/the PDs will never get your vote again if unborn children are not legally protected, starting from fertilisation.

D: Contact your Bishop

We have sent all the Irish Bishops a copy of our report. Please write to them (see the enclosed contact sheet for details) and ask them to make strong individual statements, and also a statement in unison with the other Bishops, supporting the right to life of the unborn child from fertilisation, and opposing the CAHR recommendations.

E: Join the Campaign

To find out how you can do more, contact Youth Defence on (01) 8730463 or e-mail us at info@youthdefence.ie

GLOSSARY

Glossary of Terms

Adult Stem Cells: Undifferentiated or immature cells found in many tissues of the bodies of adults, children and unborn babies. They also include other non-embryonic sources of stem cells such as those found in umbilical cord blood and placenta. They have proved to be sources of regenerative medical treatments

Assisted Reproductive Technology (ART): All treatments or procedures that involve handling human ova and sperm for the purpose of helping a woman become pregnant. *In Vitro* Fertilisation is a type of ART

Biotechnology: The use of living organisms or cells for commercial purposes, such as the development of medical treatments or drugs

Blastocyst: A mammalian embryo that has reached about one week of development post-fertilisation

Chromosome: A threadlike piece of DNA that contains many genes. Chromosomes exist in the nucleus of a cell

Cloning: The production of an identical genetic copy of a biological entity such as a molecule, cell, tissue or organism

Cryopreservation: The process by which the viability of cells, tissues, and organs, are maintained by freezing at extremely low temperatures

Differentiation: The process by which cells become specialised, or mature into a specific cell type such as a liver cell

Differentiated cell: A cell that is a specific tissue type; e.g., blood, liver, skin. There are over 200 differentiated cell types in the human body

Embryo: In humans, an embryo is the name given to the developing human being from fertilisation through to the eighth week

Embryonic Stem Cells: Cells that are derived from the inner cell mass of an embryo. Deriving embryonic stem cells from human embryos is gravely immoral because it destroys the embryo

Eugenics: The study of improving the human race by controlled selective breeding and directed reproduction

Genes: A segment of DNA that occupies a specific location on a chromosome, and determines a particular characteristic of an organism

Genetic engineering: Adding different genes to an organism to alter it in a desired way

Germ cells: Gametes or cells that give rise to gametes, i.e., ova in women and spermatozoa in men

***In Vivo*:** In the natural environment, i.e., within the body

***In Vitro*:** In an artificial environment, such as a test tube or petri-dish (literally 'on glass')

Oocyte: Precursor, in the ovary, of the ovum

Ovum: An egg; *pl:* Ova

Pluripotent cells: Stem cells that are thought to be capable of transformation into all types of tissues. Pluripotent cells are not capable of developing into an entire organism

Reproductive cloning: Cloning for the purposes of reproduction

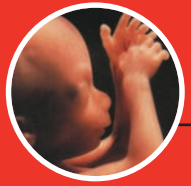
Somatic cells: All cells of the body with the exception of germ (sex) cells i.e., spermatozoa and ova

Spermatozoon: A single sperm; *pl* spermatozoa

Stem cells: A popular name for cells that are undifferentiated. Stem cells have the ability to give rise to specialised cells and are derived from embryos, adult tissues and umbilical cord blood

Therapeutic cloning: Cloning for the purposes of forming a human embryo for use in biotechnological research, or to derive embryonic stem cells

Zygote: The cell resulting from fusion of two gametes (spermatozoon and ovum) in human procreation



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