

DESIGNER BABIES

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY,
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Proven scientific techniques already exist which, when applied, have a known consequence on the characteristics of offspring. The areas of application include sex selection, the avoidance of inherited disorders and saviour siblings.

As scientific knowledge advances so the range of attributes which may be bestowed on offspring might widen to include greater intelligence, fitness or other predetermined attribute. Ethical issues would then become more stark as would the impact of such activities on the parent-child relationship.

Lord Winston provided an insight into the methodologies and future potential of research into the predetermination of the characteristics of offspring and the Rt Rev Lord Bishop of Oxford assessed the ethical, moral and religious issues surrounding the subject.

The Potential of Fertility Treatments

Professor Lord Winston

Lord Winston began by giving some background to the research work and fertility treatments currently being practised. With respect to implantation he said that from every 100 apparently healthy embryos transferred to the uterus at the right stage of the cycle only about 18 human babies were born. There was a large attrition rate. An important question to investigate was why the human embryo was so frequently inadequate with respect to implantation, although we now knew that there were a number of inherent problems associated with early development.

The figures just quoted emphasised that it was impracticable to think in terms of taking just one egg in *in vitro* fertilisation treatments. It was not a viable proposition. If you were to begin with 100 eggs, some would not be sufficiently mature to fertilise and of the rest only a proportion would go on to cleave. Of those which clove only about 50% would hatch from the shell

and of them just half, or thereabouts, would progress to become babies. Natural cycle IVF was a poor option with little prospect of success. Hence in IVF treatments it was essential to stimulate the ovaries vigorously.

A second important background topic was the human characteristic of a falling pregnancy rate with the increase of the female's age. Only 2% of older women (those in their forties) going through an IVF treatment would successfully complete a pregnancy and give birth to a live baby. Of those that did become pregnant over half would suffer a miscarriage. This increasing difficulty was reflected in natural conception; for women over the age of 40 a pregnancy was surprisingly unusual and complicated. For example, there was a significant rise in chromosome abnormality with the mother's age.

This decrease in fertility with age effect was not peculiar to humans. It was a trait observable in all mammals, but

particularly in higher primates.

The Fertility Treatment

At its basic level the practice was to take a human embryo and remove a single cell. This could be done by "drilling" a hole in the outer layer using acid and sucking out the cell. That cell could then be used for analysis, seeking either abnormal chromosomes or small gene sequences associated with a particular disease. This process could be used on someone who was a carrier or who might be producing a baby with a genetic disorder.

As a technique it was crude and invasive but, as far as he knew, it was safe. Unlike some other IVF procedures it had been studied and used extensively in animals before progressing to use with humans. Nevertheless, its use should only be considered when there was a serious indication that a chromosome or genetic disorder might be passed down the line.



The Dignity of Life

In debates on these topics arguments were put forward concerning the dignity and respect for the human foetus. In a recent debate in the House of Lords I felt wounded by statements that scientists such as myself working in this area did not confer dignity upon the embryo.

Just two days later a lady came to my clinic. She was suffering with a very serious genetic disorder on her X chromosome which resulted in serious deformities of her lower limbs. She could hardly walk. The gene responsible had not been identified but as the sex of a baby could be detected she asked that a male baby be transferred to her uterus. The danger here was that if that male had the defective chromosome then it was likely to die within the uterus. If it were healthy it would not pass on the disease. There was no way of knowing whether a female would carry the abnormality and pass it on. This lady had weighed up the risks and made her reproductive choice. I mention this episode because of this lady's statement that she wanted her children and grandchildren to have more dignity in life than she had had.

The Saviour Sibling

The Whittaker case arose because the young child had a disorder. Its bone marrow was not functioning properly and it was likely to die. The child's parents wanted another baby. They also wanted to have the embryo screened to ensure that the new baby had the right genes to produce tissue, in this case bone marrow, which might be then used in a life-saving transplant operation.

The problem here was that a pre-implant diagnosis was being offered to an embryo which could not personally benefit from it. The procedure was not medically neutral. Even although we thought it caused no problems there were concerns about subjecting a baby to an invasive technique when there was no advantage for it. Indeed, it was possible that the new baby could suffer the same problem.

At the time the press reporting was so sentimental that many of the issues were not properly covered. There had been no thorough debate.

Chromosome Abnormality

Human embryos seen in fertility clinics contained a very high proportion of cells which are mosaic. In a particular example of a normal-looking embryo of eight cells two were found to have chromosome abnormalities. This was representative of a very common situation. Indeed, perhaps 75% of human embryos were chromosomally abnormal in some of their cells. Research suggested that usually the embryo got rid of those defective cells. However, if the embryo did not get rid of defective cells then it was likely to die.

What we didn't know was what were the chances that a particular cell which had been selected being representative of the other cells in the embryo, including those with abnormalities.

“after IVF treatment there was twice the risk of having an abnormal baby”

So, if we were to consider again the eight cell embryo, if you had happened to select one of the two cells with an abnormality, you were likely to conclude that the embryo was fated to die. In practice, the embryo might well get rid of its abnormal cells and live. This was a major biological problem.

What was needed was a non-invasive technology which looked at the whole embryo; that was the only way to assess the totality of the cluster of cells. There were some techniques which showed promise in this respect.

Work on pre-implant diagnosis had indicated just how frequently abnormalities did occur. Indeed, the process itself may be a cause of some of these abnormalities. Studies with mice had shown that hormone doses did increase chromosome abnormalities in the eggs and that there was an

increased likelihood that embryos would be lost. More work with animals was essential.

Another problem was sporadic reporting. For example, we have heard of a study in Western Australia which indicated that after IVF treatment there was twice the risk of having an abnormal baby and another from the USA which showed that after IVF the risk of having a low birthweight baby was 2½ times that of the general population. While these figures were not representative of the global situation, studies from Sweden, America and Australia did contain some alarming statistics. We should be looking much more stringently at why these were occurring.

The Choices facing Patients

What were the choices facing patients with a genetic abnormality if they did not wish to go through the pre-implantation diagnosis treatment?

They could use contraception and so remain childless.

They might attempt adoption but the chances of adopting a baby within the UK were very slight; there have been less than 1,000 adoptions per annum in the UK for some time. Alternatively, they might go overseas but then there are even more unknowns for the adoptive parents to cope with.

They might proceed with a natural pregnancy with a pre-natal diagnosis and a termination of the pregnancy if necessary. Although this was allowable under the law most patients opting for pre-implant diagnostic treatment were going through the procedure because they had an ethical objection to abortion.

Finally, they might await the birth with the option of post-natal gene therapy in those cases where this was possible. This was in many ways unsatisfactory.

Conclusion

Pre-implant diagnostic techniques, when they are used today in the way that they are, are a totally ethical choice for patients with genetic disorders.

The Ethical, Moral and Religious Considerations

The Rt Rev the Lord Bishop of Oxford

The Lord Bishop said that it was the very essence of being human to interact with nature, it was an essential aspect of our dignity and vocation as human beings.

Nevertheless, there was an accumulated wisdom in nature which it would be foolish to disregard. After all, it had taken some 16 billion years to arrive at where we were now, with 35,000 genes and 3 billion base letters. It was a very complex and highly balanced system which had evolved over those millennia. That accumulated wisdom required a fundamental respect.

So, together with a proper vocation of human beings to interact with and manipulate nature there needed to go a fundamental respect for the accumulated wisdom of nature. That indicated a proper use of the precautionary principle.

The Early Embryo

One issue which did arise for many people considering the subject of fertility treatments was the moral status of the early embryo. There was a great degree of loss of embryos during IVF treatment while pre-implantation genetic diagnosis did involve an intrusive manipulation of the embryo. It was therefore essential to have some view of the respect due to the embryo.

The Roman Catholic view, shared by many others, was that human life had to be protected absolutely from the moment of conception. In other words, from the first moment of existence a human embryo had to be recognised as having the full rights of a

person, among which was the inviolate right of every innocent being to life. That was a view which needed to be taken seriously.

The Christian tradition was not as monolithic as it was sometimes portrayed. There was a text within the Book of Exodus which said that if as a result of a scuffle a pregnant woman lost her baby then, if that baby were unformed (that is, in its very early stages) then the penalty which would accrue to the person who caused that loss was a financial one. However, if the lost baby were formed and in its later stages of development then it was a capital offence.

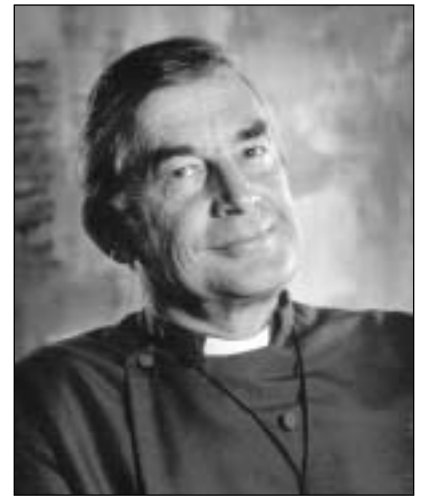
That distinction had been made in an early Latin translation although it was not included in the current English translations. This text influenced early Christian thinking.

Aristotle's Legacy

The Christian church was much influenced by Aristotle's view that first there was a "vegetable" soul, then an "animal" soul and finally a human soul. The mail embryo achieved a full human soul after 40 days and, regrettably, the female after 90 days. Although we didn't share that philosophy now, it did recognise a gradualist approach which led to an increasing respect for the evolving embryo.

The Distinction of Respect

As a result of these two factors the Christian church, at least from the fourth to the nineteenth century, made a sharp distinction in the penalties



which accrued for abortion depending upon whether the embryo was formed or unformed.

In 1869 the Pope abolished these distinctions so for the Roman Catholic church today such distinctions no longer applied. Nevertheless, the Western Christian tradition, for most of its existence, did accept that the text from Exodus and Aristotle's views were moral "insights" which indicated that it was legitimate to distinguish between the respect due to an embryo in its early stages and the absolute respect due in the later stages.

Another argument could be based on the very high rate of loss of embryos in the early stages following conception. About two thirds of embryos were lost. If each of these early stage embryos possessed a full human soul then, putting it crudely (for which the Bishop apologised) Heaven would be mainly populated by the souls of people who had never been formed.

A more philosophical argument was that the rights which accrued to what was actualised did not necessarily accrue to what only had potential. An obvious example was that a qualified doctor had certain responsibilities and particular rights, but not all these responsibilities and rights belonged to a medical student training to be a doctor.

There was thus a number of considerations which might lead a person to take a view rather different from the stated Roman Catholic position.

Gene Therapy

All types of gene therapy were at a very early stage of development. A distinction could be made between a gene therapy which was for the purpose of getting rid of damaged genes or genes which were the cause of serious diseases, and genetic manipulation which was concerned with the enhancement of certain specific qualities.

Certain diseases, such as cystic fibrosis, were dependent on one particular gene. A genetic therapy aimed at allowing a child who might get cystic fibrosis to grow up free of the disease would be wholly beneficial. Most people would say that if developments were to proceed along those lines then that would be entirely moral and thoroughly worthwhile.

Enhancement

A gene therapy for the enhancement of human qualities was definitely on the ethical agenda even though such therapies were not currently possible, indeed might never be so. There were a number of other considerations. First of all, there was what had been termed the "tyranny of the normal" and, closely associated with that, the horrific possibility that people might choose to have babies according to certain passing fashions. Was this something that we would regard as desirable?

More seriously was the whole question of the relationship between a parent and a child who was born and who grew up as a result of having particular genes in some way chosen for them. All parents tried to give their children advantages through education,

persuasion and moral example. But they tried to influence their children while at the same time respecting their free choice. But if parents were to have children which, as a result of the parents' choice, grew up with a particular physical build or a particular set of capacities, what would happen if a child became deeply resentful about the choices that its parents had made on its behalf? It was difficult enough as it was to bring up teenagers. There were more than enough clashes already over parental choice. What would it be like if they were stuck for their entire lives with physical characteristics or mental capacities that they didn't want? Of course, it was highly desirable to have intelligence but you didn't necessarily want a first-class chess playing mind. It was good to have a good physical build, but again you didn't necessarily want to be like a second row forward just because your father loved rugby.

Memory was a mixed blessing. Indeed, much of life was made better by our ability to forget. A person endowed with a truly wonderful memory as a result of genetic manipulation could end up experiencing a very different form of human life.

There were many things to worry about on the parent/child relationship. This was certainly one of the things on his mind during the Select Committee's investigation of stem cell research, particularly when reflecting about cell nuclear replacement. Apart from the fact that it was not yet a scientifically safe procedure (and that in itself was an ethical consideration) if a father were to clone a child what would

happen if the child grew up disliking many of the characteristics it saw in its father only to find that they were identical with their father? Could it not lead to self-disgust and self-hatred?

Germline therapy was the manipulation of genes with a view to affecting not just a particular patient, but also all succeeding generations. Apart from the current illegality there were other considerations. It was not just a question of fashion, of what kind of children we, from a personal point of view, would actually want for the future. There would be political considerations of the sort raised by George Orwell and the Brave New World. This might seem unrealistic at the moment but nevertheless it was a consideration and needed to be taken into account. Again, there would be not just the resentment of particular children to particular parents for making them in a particular way, but the resentment of future generations against their forebears.

The question of sex selection had recently been in the news. The HFEA had consulted and come out against sex selection simply on the grounds of balancing the family. Sex selection was technically possible and also legal in certain circumstances. Some genetic disorders were transmitted down either the male or female line. It was legitimate to select the sex of a child on such sound medical grounds.

The HFEA would undoubtedly continue to have difficult choices. It was essential to have the ethical aspects fully discussed before it was faced with a decision.

In discussion the following points were made:

There were many procedures being undertaken which related to fertility and the beginning of life. Some were more developed than others and there was a great need for the use of animals to consolidate these to ensure their efficacy.

There was a high frequency of chromosome abnormality even from natural fertility methods. Nature rejected most. The increase in frequency of abnormality with maternal age was higher in humans than in other species.

No culture accorded the aborted foetus the same bereavement rights as a human once born, an indication of differentiation of respect. The law required certainty, which the 14-day criteria gave.

While the attitude of a child brought into the world with the ability to donate tissue to a sibling might be very positive, particularly for blood where the procedure was straightforward, there might be different reactions in the instance of kidney failure.

There was a danger that screening and destroying defective fetuses could engender a culture which devalued the disabled.

As the world population increased so there would be pressures to limit the number of offspring, even in developed countries. Would not parents then want to take every precaution to have a child as free from illness as possible?