

The subject of cloning, in its various guises, is a topic likely to produce markedly polarised opinion in any debate. In the wake of recent approval given to several therapeutic cloning projects, embryologist Sammy Lee provides a personal view on the essence of life.

Cloning today

Nine years on from Dolly

Recently, Professor Ian Wilmut was granted only the second licence from the Human Fertilisation and Embryology Authority (HFEA) to carry out therapeutic cloning. However, some would argue that this action represents a further step down the slippery slope to human cloning that Wilmut and his team embarked upon when they cloned Dolly the sheep in 1996.

Most scientists believe that the mechanics of cloning are fairly easy: obtain a donor egg, remove the nucleus (the DNA), and insert the nucleus from a skin cell (from the clonee) into the egg. Then, with the help of an electrical current, the cell should begin to divide and develop into a generated twin (clone). It really is that simple! "It's inevitable that someone will try and someone will succeed", said Delores Lamb, an infertility expert at Baylor University in the USA, in 2001. At that time, the consensus among biotechnology specialists was that within a few years some scientists would break the news of the birth of the first human clone. This duly happened in December 2002, but little more has been heard since then.

So, to what extent do we want to go down the path of using reproductive technologies to genetically shape our children? In 2001, a Time/CNN poll showed that 90% of respondents thought it was a bad idea to clone human beings. In the area of reproduction, however, opinions can change very quickly. A poll conducted today might well produce very different results.

A world in which cloning is common place may well introduce many strange possibilities. For instance, a woman could give birth to her own clone – is the child her daughter or her sister? A couple have a cloned son and divorce subsequently – how will the mother feel about seeing a younger identical copy of the person to whom she was once married? Clearly, the challenge facing would-be pioneers in this

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particular area is to make a convincing case that the technology is not immoral, however immorally it could be used.

Of much more interest, however, is therapeutic cloning and the hope that one day we will develop the ability to clone adult human cells to ‘grow’ new hearts, livers and/or nerve cells.

Therapeutic human cloning

Human embryonic stem cells have the ability to develop into any adult human cell type. The production of such cells from a patient's own tissues would allow rejection-free autologous transplantation. Embryonic stem cell technology is recognised as the ‘holy grail’ of tissue engineering.

The first attempts to culture human embryonic stem cell lines were reported in 1994 from Singapore by a team who used surplus embryos from *in vitro* fertilisation (IVF) cycles. The cell lines could only be maintained in culture for a short period of time.

However, if we are able to unravel the mysteries of stem cells derived from early embryos no larger than a full stop, we may be able to create all the cell types in the human body. Coaxed along different developmental pathways, such cells might provide limitless tissue for engineering organs and transplantation.

While the HFEA in the UK is adamant in its opposition to human cloning, it views therapeutic cloning positively, even if many people regard it as a step too far towards human cloning. However, therapeutic cloning is all about saving lives, whereas human cloning is about creating life, so it is unlikely to create a climate in which people

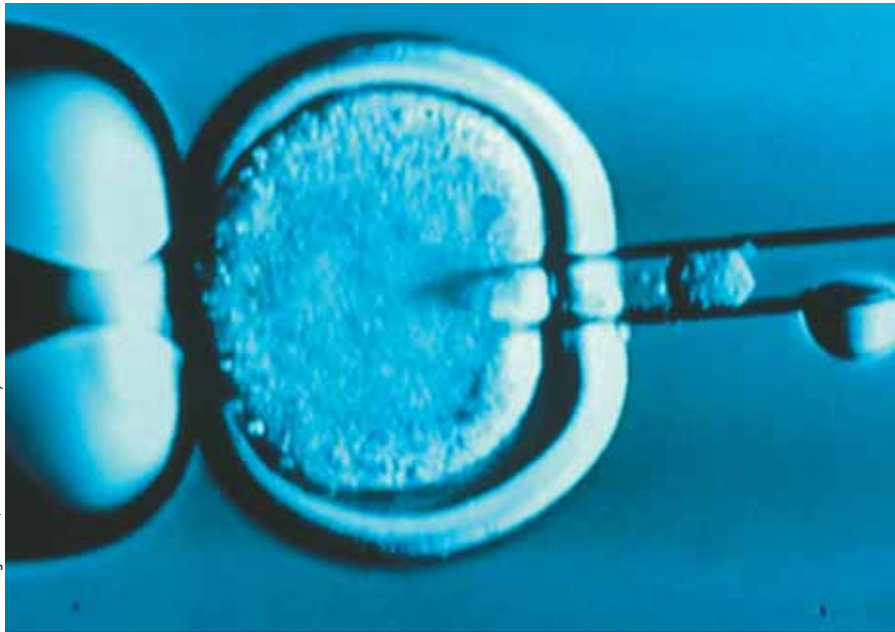
would be encouraged to use cloning as a means of reproduction.

By allowing therapeutic cloning we will be able to study how a somatic cell (eg a skin cell) can be reprogrammed to ‘forget’ its differentiation and to turn back its clock to become ‘flexible’ again. The ultimate aim is to be able to create new cells by reprogramming healthy differentiated cells to replace diseased cells. For example, cheek mucosal cells might be used to create brain cells in an effort to cure Alzheimer's disease, or skeletal muscle cells might be used to repair damage from a heart attack.

The urban myth that hundreds of thousands of embryos have been created for therapeutic cloning research in Britain is a disturbing picture, but it is untrue. In truth, in the UK, up to March 2003, fewer than 1000 were created for research! In the USA, Advanced Cell Technology has continued to pursue such research, which promises to create human ‘spare parts’ and to cure disease. Scientific ideals notwithstanding, the technology is opposed by the Vatican, which regards it as “the deification of the scientist, and the indefinite postponement of death. It is the immortality project”.

Concerns about Professor Wilmut's proposals fuel the fear that Parliament's approval of therapeutic cloning has made the UK something of a moral pariah among nations. Is therapeutic cloning really dangerous science – unnecessary, unprincipled and immoral? Does it ruthlessly sacrifice future generations for the sake of extending the lives and comfort of spoiled people?

The answer to all these questions is an emphatic no! Most people in the USA and



James King-Holmes/Science Photo Library

Light micrograph of the transfer of nuclear material to an egg that has had its genetic material removed during the cloning of a sheep.

the UK are in favour of research that might result in tissue engineering through the use of embryonic stem cells. Very few people would not wish to take advantage of treatments developed from spare embryos that remain after fertility treatment and would otherwise be discarded.

Professor Severino Antinori, Italian fertility expert and a champion of human cloning, is correct in supposing that the UK stance on therapeutic cloning may have helped to legitimise his plans. However, some have claimed that the British public has listened not to mad scientists but to bad scientists. Antagonists suggest that 'spare body parts' can be grown from adult stem cells or cells taken from the umbilical cord. However, if we are to 'build' organs for transplantation, use of these methods will not provide the millions of cells needed to construct a new heart or kidney. Such numbers are more likely obtainable only through therapeutic cloning.

Human cloning, which produces a human being with the same genes as another human being, provokes the greatest reaction. Clearly, there is a need for reflection. Morality helps mankind determine right from wrong. Good morality, however, is not innate; rather, it develops in society and is underpinned by the establishment of good moral principles. In Huxley's *Brave New World*, 'eugenics' is performed through misapplication of technology by the state, whereby infants are programmed while they sleep to develop predetermined attitudes.

To clone or not to clone?

So, where does this widespread hostility to the cloning of human beings come from? The existence of nature's own human clones, identical twins, seems harmless enough. Although Jungian fantasy that we all have a

doppelganger, someone who is an evil human mirror of ourselves, has dark implications. The myth that genetic identity equals personal identity probably lies at the root of the misunderstanding about cloning.

A common criticism of human cloning is that it is unnatural. But what does 'unnatural' mean in this context? Anything that occurs in nature could be said to be natural. Another definition of natural is 'unaffected by human intervention', thus, those who behave immorally are acting unnaturally. Moreover, if we do something that undermines human moral nature then this is deemed to be against nature itself.

In the same vein, some argue that cloning undermines personal identity and dignity, affecting autonomy, individuality, personality, uniqueness, and producing carbon copies, photocopies, stencils and fake human beings. Just what is a twin? All identical twins have a cloned brother or sister. In fact, they are more than just identical clones because they gestate at the same time in the same womb and are raised simultaneously in the same environment by the same parents. However, even though genes and background are the same, they often develop into very different people. Even though their genetic fingerprints are the same, they are unique, each possessing a soul, which cannot be cloned!

Consider how twins are acknowledged as individuals, each with their own autonomy. Genetic identity does not equate to personality identity. Some argue that there is a difference and that deliberately cloning a person is an act resulting in a diminution of human dignity. Immanuel Kant stated that human dignity is concerned with our ability to be autonomous. When we respect human dignity, we treat others with respect;

thus, if clones are respected, it is unclear why cloning should in any way undermine such dignity.

So, what about parents who seek to have a child because they wish to provide a donor of bone marrow for an existing child ill with leukaemia? Some would argue that the new child is merely being used; however, if it is loved and cherished, not just as a means to an end, but equally in its own right, then where is the harm?

Does human cloning do any harm? Are there any benefits? Ira Levin's 1976 work of fiction *The Boys from Brazil*, in which clones of Adolf Hitler are bred and then brought up in family situations that mirrored his early childhood, has had a significant impact on public opinion against cloning. Stories have been circulated about abnormal embryos, fetuses and births. Theoretical reasons have been used to predict dire consequences for the offspring of human cloning, and scaremongers suggest that clones would be prone to various diseases and to premature ageing.

However, the considered view is that the problem likely to be encountered will be but a drop in the ocean compared with the day-to-day ills that currently pervade modern Western lifestyles. What we must avoid is the social structures that permit dictatorships and other forms of authoritarianism, which bring about the conditions where human cloning may be perceived to be or be abused. ■

SUGGESTED FURTHER READING

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