

## The rise of the clones?

Michael Lacewing

### **Reality: Creating stem cells for medical use**

#### *Embryonic stem cells*

Embryonic stem cell lines are created by removing an inner cell mass from a five- to seven-day-old fertilized egg/embryo, a procedure which kills the embryo. When properly nurtured, the cells are able to replicate themselves, creating what is called a stem cell line that provides continuing opportunities for research. The undifferentiated cells have the potential to become any type of cell - brain, heart, liver, bone. The embryos used are surplus ones created by IVF treatment.

#### *Cloning from adults*

However, patients might reject tissue grown from them embryonic stem cells. Cloning hopes to overcome this. The aim is to take the DNA from one of the patient's cells, and put into a human egg cell that's had its nucleus removed. Once again, the eggs used are surplus ones created by IVF treatment, that have failed to be fertilized. The cell is multiplied in culture to form the embryo, the stem cells removed, and treated to trigger their growth into whatever's needed - blood, brain or skin cells - so they can be transplanted back into the patient. The point is that the cells created are genetically identical to one's own, so can replace dead cells. This may help lead to cures for diseases such as Alzheimer's and Parkinson's. Doctors claim millions of patients could benefit: kidney dialysis replaced by transplants of manufactured insulin producing cells. Hepatitis, osteoporosis, Parkinson's disease, even serious burns are all candidates for treatment.

#### *Practical problems:*

But it is very difficult to create 'normal' embryos cloned from adult cells. This is clearest from looking at what happens to those organisms that are clones. The process is the same as above, but rather than removing stem cells from the embryo, it is placed into a womb and allowed to mature into an organism. This is known as reproductive cloning.

Many clones die early or are born with genetic deformities, and develop diseases such as cancer. 'Success rates remain low in all species, with published data showing that on average only about 1% of 'reconstructed embryos' leading to live births. With unsuccessful attempts at cloning unlikely to be published, the actual success rate will be substantially lower. Improving success rates is not going to be easy.... At present, the only way to assess the 'quality' of embryos is to look at them under the microscope and it is clear that the large majority of embryos that are classified as 'normal' do not develop properly after they have been implanted.'

(<http://www.roslin.ac.uk/public/cloning.html>)

'Most of the work on understanding the biology of [stem] cells, how to use them, how to turn them into particular cell types for eventual applications, will come out of work on cell lines derived from surplus embryos not cloned ones.' Professor Peter Andrews, Sheffield

### *Progress*

Research groups around the world have reported the cloning of cattle, sheep, mice, goats, pigs, and most recently, cats and dogs. It was thought that the first human cloned embryo was created in February 2004, by Dr Hwang of South Korea. This was cloned from DNA from embryonic stem cells, i.e. it was a clone of another embryo. In May 2005, Dr Hwang claimed to have created stem cell lines from adult cells, i.e. claimed to have created a 'patient-specific' clone, a embryonic clone of an adult human. However, in the last eight weeks (Jan 2006), both claims have been exposed as fakes.

However, in May 2005, scientists at University of Newcastle succeeded in creating a cloned human embryo, using the DNA from embryonic stem cells. As of January 2006, no clone of an adult human has been made.

Again, the point of cloning embryos is to develop stem cell lines for medical use. Cloning is only allowed for therapeutic purposes, and under a strict licence. Legislation in the UK outlaws human cloning for reproductive reasons, ensuring scientists are banned from making copies of people. It is illegal to create a cloned embryo, implant it in a woman, and bring it to birth, i.e. to clone for reproduction. But scientists are nevertheless working on developing the technology to clone human beings.

### *The status of embryos*

Is it morally permissible to

- a) create embryos in IVF treatment?
- b) use surplus embryos in medical treatments?

An alternative: these special stem cells are found in adults too. Opponents argue research on embryonic stem cells is simply unnecessary: adult cells work just as well. Adult bone marrow stem cells have been turned into blood, bone, liver, muscle and nerve cells. Although exciting developments are being made with many other types of stem cell that are extractable from adults, many scientists believe only the embryonic stem cells will offer the full range of benefits and tissue types they seek.

### **Aspiration: Cloning for reproduction**

#### *The hype*

In 2001, Doctor Severino Antinori claimed he would try to clone a human being before the year is out. In July 2002, a French newspaper published an interview with Antinori in which he claimed 18 women were now pregnant with cloned embryos. But Antinori later denied this report, saying he was not involved in producing a cloned human being.

That same month, July 2002, the company Clonaid claimed that several women were pregnant with cloned embryos. In December, they said a woman had given birth to a cloned girl; by March 2003, they claimed five cloned babies had been born, and by October 2004, they claimed 13 had. However, to this day, no proof at all has been given that the children are clones, the DNA evidence has not been produced.

Clonaid was founded by a religious cult, the Raelian Movement, which believes life on Earth was created by a genetic engineering experiment carried out by super-intelligent extra-terrestrials. They think cloning is the means to eternal life, and in the wake of September 11<sup>th</sup>, said that it would render terrorism pointless, since each victim could be cloned, and so re-created. They also claim to be making progress on brain mapping and personality transfer.

Given the great difficulties in creating a human clone, virtually all scientists are extremely sceptical.

#### *Justification*

Antinori claimed to be acting solely to enable couples who would otherwise be infertile to have children. He runs a fertility clinic in Rome, and the plan was to make his method of human cloning available to couples who cannot have children by any other means - for example, when test tube fertilisation is impossible because the man produces no sperm. He denied that he would ever try to use his cloning technique for single women, for couples who wanted to clone a dead child, or for childless couples who desire to have children late in life when normal reproduction is impossible. But he first attracted media attention in 1994, when he enabled a 62-year-old woman, well past her menopause, to conceive and give birth to a healthy child.

#### *Identity*

Cloning will not 'recreate' a person. A clone might be 99.95% genetically identical to the original but it will grow up with a personality and behaviour all of its own. Clones can also be different physically, e.g. differences in nutrition within the womb and after birth can lead to differences in size. Clones will also have all the differences that are not determined genetically.

#### *Playing God*

Roslin: 'Those concerned that scientists were "playing at God" seemed to ignore how much mankind has altered the cards that we were originally dealt. Animals were first domesticated about 5000 years ago and selective breeding since has produced modern strains of livestock, plants and pets which are very different from their original progenitors. In medicine, our current life expectancy of well over 70 years is a result of direct intervention in nature, from improved prenatal care, vaccination and use of antibiotics. The human condition is still far from perfect and there is no particular reason now to call a general halt to what most people view as progress.'