

Genetic Engineering Issues

Therapeutic Cloning

In 2001, the BBC broadcast a TV series called 'How to Build a Human', showing the creation of a cloned human embryo for the first time. This is done by removing the nucleus of an egg and replacing it with a donor cell. The aim is to create stem cells that are pluripotent – able to regenerate any cells in the human body.



Dr Jose Cibelli estimated that 120 million people could be cured through therapeutic cloning. Current treatments in 2012 include replacing cells damaged by cancer, skin grafts for burn victims, and new cells to treat eye diseases.

Critics claim that there are alternatives not involving the creation of embryos, such as using adult stem cells or umbilical cord blood.

GM Crops

Crops can be genetically modified to resist disease, frost, acidity and salt, enabling people in the poorest countries of the world to grow crops in extreme conditions.



Golden Rice is a specific crop that has been genetically modified to combat malnutrition by containing beta carotene. This could help millions of people who are malnourished, and prevent blindness due to Vitamin A deficiency.

Crops can also be genetically modified to produce vaccines, hormones, antibodies, antibiotics and anti-HIV drugs

Reproductive Cloning

In 1997, Dolly the sheep was the first mammal to be cloned from an adult cell. She got arthritis early and died young. There are fears that human reproductive cloning could have dire consequences, and as such it is illegal in most countries.

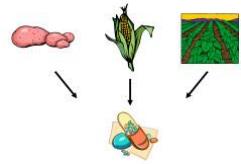


Possible uses for human reproductive cloning:

- To replace a dead child
- To create a cloned army (like Star Wars)
- To create a biologically related child for infertile couples
- To create a 'younger you' and transplant your brain into the body

Pharming

Animals and plants can be genetically modified to produce medicines. ATryn is a brand of anticoagulant, used to help prevent blood from clotting. It is produced in the milk of goats genetically engineered to produce human antithrombin. One goat produces the same amount of anticoagulant as 90,000 blood donations.



Other species genetically modified to produce pharmaceuticals (hence 'pharming') include:

- sheep and cows
- potatoes, rice, barley, corn, peas

Concerns include that potentially dangerous pharmaceuticals could enter the food supply.

Pre-implantation Genetic Diagnosis

PGD is used in the UK to screen for inherited genetic disorders like Cystic Fibrosis, Down's Syndrome and Huntington's Disease.



In the US, PGD is now routinely used to select the gender of a new child.

One clinic in America offered further choices, for physical characteristics like hair and eye colour, but pressure made them withdraw this offer.

PGD can also be used to screen for a donor match for an existing child ('saviour sibling'), although in the UK this can only happen when there is a risk of an inherited disorder for the new child.

GM Bacteria

In the 1970s, bacteria was genetically modified to create 'artificial insulin' for **diabetes**. Similar bacteria have been used to produce clotting factors to treat **haemophilia** and human growth hormone to treat various forms of **dwarfism**. These new treatments are safer than those previously taken from dead bodies that could transmit diseases.



GM bacteria has other uses as well. It has been developed to leach copper from ore and clean up mercury pollution.