

GENETIC ENGINEERING

Scientists can now alter the genetic code - the very blueprint of life. Some scientists claim that it holds great promise for the future of medical research. But is it true, and what does it mean for animals?

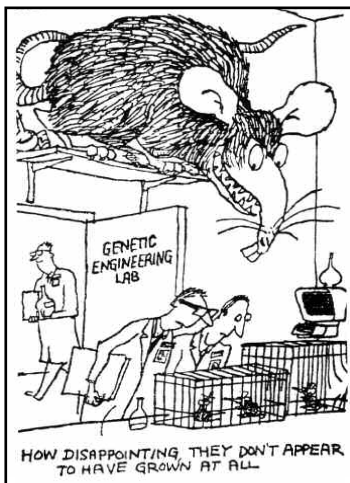
WHAT ARE GENES?

Every living thing has a genetic code in each of its cells, which determines how it will grow and what it will grow into. As a human being, you have approximately 20-25,000 genes, contained in the chromosomes, within the nucleus of every cell in your body. The genes are composed of DNA, which helps to build the proteins that construct and control the body. Different genes are responsible for physical characteristics such as hair and eye colour, and some genes are responsible for genetic defects, like cystic fibrosis. In most cases of genetic defects, individual genes do not cause such diseases. They are 'triggered' by environmental factors, and/or by the behaviour of other genes.

What is genetic engineering?

Animals have been used in experiments for decades in an attempt to find cures for diseases that affect people. This has led to a great many failures because animals' bodies are fundamentally different from ours. They don't get the same diseases as us and they often react very differently to drugs and chemicals.

Scientists are now using new genetic engineering technology in an attempt to create 'designer animals'. The aim is to 'model' in animals the diseases from which humans suffer. Genetic engineering is different from traditional selective breeding, where the organism's genes are manipulated indirectly.



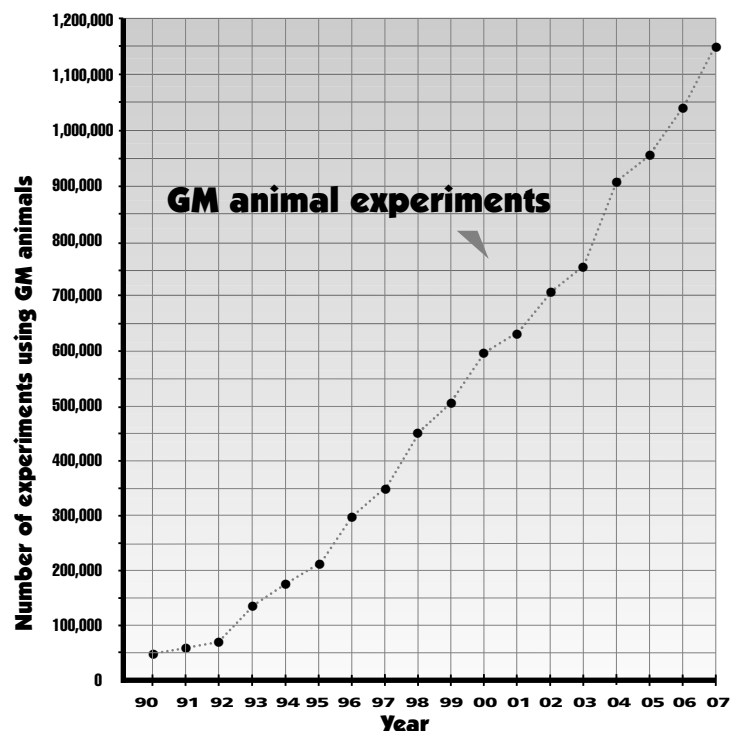
The majority of genetically modified (GM) animals currently used in biomedical research are **transgenics**. There are two basic methods of creating these:

In **knock-out** animals, scientists have deleted, or disrupted the DNA in a gene, so that they can observe what happens when the gene fails to work.

Knock-in animals are used to study how a gene from one animal works in another. This is done by putting the foreign gene into a target animal and observing what happens.

There are now hundreds of different types of transgenic mice available commercially from catalogues or online. They are marketed just like any other piece of laboratory equipment.

Genetic engineering is the most rapidly growing area of animal experiments



Animal suffering

In order to create a new strain of mice, young females are injected with powerful hormones to make them ovulate excessively. After mating, they are killed and the embryos extracted. The embryos are injected with the foreign DNA. These altered embryos are then surgically implanted into many surrogate mothers who have also been hormone-injected to assist implantation and who will later be killed just before or after giving birth.

There is a massive failure rate in creating new transgenic animals: 90-99% of the offspring will not have

incorporated the new gene and will be destroyed as 'failures'. For every successfully produced GM animal, hundreds die either in the womb, or soon after birth, or are killed as unwanted surplus. Even when the desired result is obtained, the GM animal will suffer additional side-effects, as well as their designer disease, because the consequences of inserting new genes is so unpredictable. These unintended effects range from arthritis and heart disease to premature ageing.

GM animals in laboratories

Animals are genetically modified to mimic human illnesses, including asthma, diabetes, cancer, cystic fibrosis, heart disease, neurological (brain) disorders and many other conditions.

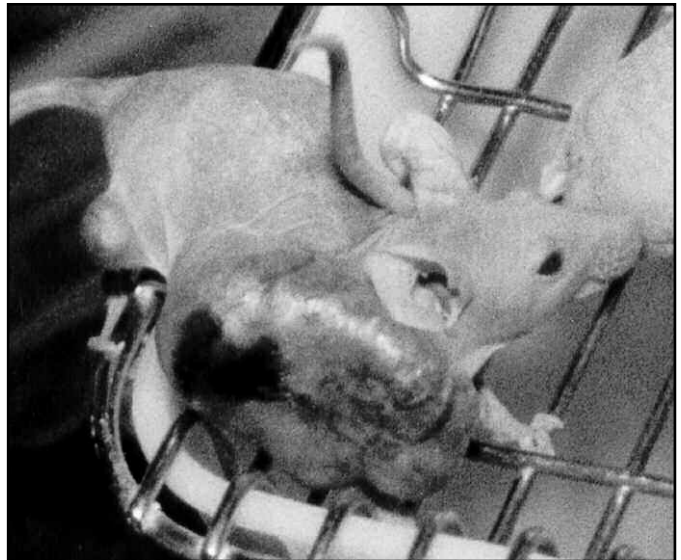
But although the symptoms they display may appear to be similar to the human disease, these animal 'models' often react very differently, thus misleading scientists and slowing down medical progress. For example, human cystic fibrosis patients suffer mainly from serious lung infections. Mice, however, have fewer mucus secreting cells in their respiratory system. Therefore, lung disease is mild and infrequent in them - but up to 90 per cent fatal in humans. 'Cystic fibrosis mice', on the other hand, suffer from bowel disorders that are rare in people.

Using GM animals in experiments produces results that are no more reliable than those obtained from ordinary animal experiments. Nevertheless, the use of GM animals in research is rocketing (see graph overleaf). The number of animals has quadrupled since 1995. Genetic engineering research accounted for 33% of all animal experiments by 2005.

The animals most commonly used for GM research are mice, but many scientists see primates as the ideal GM 'model'. ANDi, the world's first transgenic monkey, has already been produced in America.

Xenotransplantation

Genetic technology is now being used in an attempt to breed animals whose organs can be removed and transplanted into human beings suffering from liver, kidney, heart and other problems. Experiments have been carried out in which genetically modified pigs have been used, and their 'humanised' organs have been



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inserted into 'normal' monkeys to see what happens. Such experiments have not only not worked, but have also caused enormous animal suffering. Putting animal organs into humans risks transferring deadly new diseases to people - for example all pigs carry an HIV-type virus, as well as other potentially dangerous pathogens. There is also the problem of how to prevent rejection of the foreign organ once transplanted into the human donor.

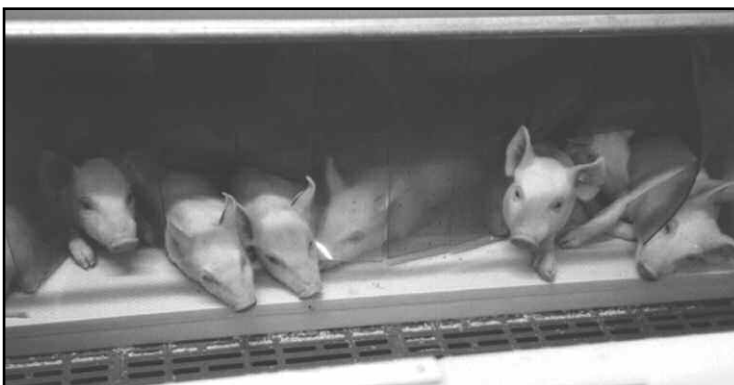
Animal patents

GM technology is big business. One way that companies can make money is by patenting their 'inventions', which means that they have exclusive commercial rights over the new genetically modified animals whom they create.

The first animal to be patented was the **onco-mouse** - in America in 1988. This very broad patent covered all mice genetically engineered to develop cancer. The European Patent Office banned the patenting of whole living animals and plants until January 2000, when the ban was lifted. Many people strongly believe that it is morally wrong to patent living animals.

WHAT YOU CAN DO!

- Join the Animal Aid youth group, and help to campaign against all animal experiments.
- Order a free Animal Testing Info Pack (contact us or order from our website).
- Find out more. Check out our website: www.animalaid.org.uk/youth
- Write to your MP and Euro-MP to voice your opinions about the use of animals in genetic engineering experiments.
- Ask your teacher if someone from Animal Aid can come to your school to give a talk on animals in medical research.



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