

Case study: Meeting the need for donated organs

The global challenge

In 2014, around 120,000 people received organ transplants worldwide. However, it is estimated that more than one million people would have benefited from an organ transplant, if it had been possible. The most common organ transplants are kidney, liver and heart. In developed countries, one of the major limitations on meeting demand for organ transplants is a lack of appropriate organs for donation. There are both international networks for the ethical sharing of organs and an international black market in organs for transplant, especially kidneys.

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Current approaches to meeting the need for donated organs

The most common approach to increasing the availability of organs for donation is running public awareness campaigns. Some countries, like Wales, operate an 'opt-out' approach to organ donation, so people have to remove themselves from the list of organ donors rather than add themselves to it. For kidneys, because people can donate one of their two kidneys and still survive, some people argue for a regulated market in which kidneys would be sold legally to make money. Such a market already exists in Iran.

A genetic technologies example

Pig organs are roughly the same size and do the same jobs as human organs, which means they are good candidates for human organ transplants. Valves from pig hearts are already used in people. However, pig cells carry retroviruses as part of their DNA that make normal pig organs potentially dangerous to humans. Using genome editing, scientists have demonstrated it is possible to make this viral DNA inactive in pig cells to stop it being infectious. They also demonstrated that the genome editing had not had any unintended effects and used the edited cells to develop pig embryos. From these embryos, fifteen piglets were still alive at the time the research was published and scientists continue to monitor them for any negative effects of the procedure.

Whilst this is a necessary step towards making pig organs that are suitable for use in humans, there are further practical, safety and ethical concerns that would have to be addressed before pig organs could be transplanted into people.

UK facts & figures

- There are currently 6,500 people on the NHS's organ transplant waiting list
- Last year, nearly 500 people died while waiting for an organ transplant
- In the UK, it is particularly difficult to get transplant organs for people in minority ethnic groups, from which there are fewer potential donors.

Arguments in favour of using genome edited pig organs

- If pig organs were made suitable for use in patients needing an organ transplant, this would reduce the deaths associated with waiting for organ transplants
- As people waiting for an organ transplant need medical care, if increasing the supply of suitable organs for transplant reduced waiting times for organs, this would reduce the pressure on and costs to health services

Arguments against using genome edited pig organs

- The long term consequences of the technique (CRISPR-Cas9) used to edit the DNA in pigs are unknown
- Some people will object to animal organ transplants for animal rights or religious reasons