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Here's to xenophobia

Are transplants with animal organs dangerous?

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Disturbing questions arise with many new technologies. The benefits are often clear; the risks difficult to quantify. Yet when the risks cease to be the thin spectres conjured by scaremongers and are demonstrably real, how great must the benefits be for us to press ahead with implementing the technology anyway? Perhaps no technology today places these questions into sharper focus than xenotransplantation, the transplanting of animal organs into people.

Organ transplants are the fruits of a grisly harvest: thousands of people wait for the death of someone else so that they themselves may live. Yet healthy people do not die often enough to meet the demand for spare body parts. In the US alone, the current shortfall is about 75,000 organs. Most of those waiting will die before surgery.

One of the most promising solutions to this problem is the use of organs from animals. Xenotransplants would potentially be limited only by the speed with which surgeons could perform operations. But before xenotransplants of whole organs can become routine, a number of problems must be overcome. For example, the human immune system recognises transplanted animal organs as foreign, and launches a violent attack on them-known as hyperacute rejection. But such difficulties are likely to be surmountable. Genetic engineering may soon be able to produce pig organs that "look" human enough to fool the immune system into tolerating them. Indeed, for complex organs such as livers and kidneys, it will be easier to dupe the immune system than to build artificial organs.

But while xenotransplants have the potential to save lives, they also have the potential to wreak immeasurable harm: animal organs carry with them the risk of new diseases. This is not a hypothetical risk. Test-tube experiments have shown that baboon and pig viruses can replicate in human cells. Although a survey of 160 patients who had been exposed to living pig tissues did not show any signs of infection, none received a whole organ. And at a recent meeting of the American Society for Microbiology, scientists from Pittsburgh University produced evidence that a baboon virus had remained present after landing in a human as a result of a baboon-to-human liver transplant in 1992.

This virus was the baboon version of a virus that humans already have, cytomegalovirus. The human version is a common problem in traditional transplants: it is an opportunistic infection, attacking people with depressed immune systems. The organ recipient in this case was HIV positive, and perhaps that disease facilitated the transfer of the baboon virus. None the less, it shows that the risk of cross-species infection is real.

Predicting whether a virus will be able to jump the species barrier to infect a new host is an uncertain business. But at least two diseases have done so recently: Aids and mad cow disease. Genetic distance is no guarantee of safety. Humans and pigs have lived in close association for centuries and already share more diseases than humans and monkeys.

Even more difficult than predicting which viruses will jump is predicting the effects if they do. Just because a virus is harmless in one setting does not mean that it will remain harmless in another. Simian haemorrhagic fever virus, for example, is harmless to baboons-but deadly for macaques.

Most diseases that have come to us from animals have come from food. None has ever had such a plush red carpet rolled out as a transplant organ. An unlimited source of new organs from animals is a dream come true. But the risks are real. If we decide to press on, great vigilance will be required.