

## *Is Xenotransplantation ethically acceptable?*

This activity introduces 4 case studies that highlight some of the ethical issues involved in xenotransplantation. The students discuss these in groups and try to reach a decision, using ethical principles.

Start by explaining what is meant by xenotransplantation. Put the 'viewchart' provided on student page 8 on the wall and then ask all students to record their opinion by putting a mark or a sticker at the point that corresponds to their position.

All students will need the summary of the four ethical issues, student page 1 and the ethics summary, student page 2. Each small group will need copies of one of the four case studies.

After the group discussion allow time for feedback from each group and for general discussion. Then ask all students to once again record their opinion on the 'viewchart', using a different colour to see if opinion has changed.

### *References*

**Specification**  
9.3 Medical Ethics

**Textbook**  
Chapter 3

### *Method*

#### **Hints on running small group discussion**

- Make sure that the task is clear and has a definite product which has to be communicated back.
- Make sure they have enough knowledge and resources to complete the task.
- Don't let it run for too long. Some groups will stray off task.
- Drop in on groups for short periods with support or challenge as appropriate.
- Make sure that seating allows everyone in the group to see each other, best round a table not side by side.
- Do not allow one group to become too noisy. They will attract interest from other groups, who will then lose their own identity.
- Normally groups work best with friends because they trust them but be prepared to break up groups which are not working. Some members will be pleased. Allow time for feedback at the end and value the contributions of all groups.

## **Xenotransplantation: ethical issues**

### ***Is it ethical to use animals to provide 'spare parts' for humans?***

For many people, the main ethical problem raised by xenotransplantation concerns the relationship between human beings and other animals. The question is how far, if at all, and in what ways, it is acceptable for humans to use other animals as a source of organs. And if some use of animals for xenotransplantation is considered ethically acceptable in principle, how can the welfare of the animals be adequately protected?

### ***Is making transgenic pigs containing human genes ethical?***

Pigs bred for xenotransplantation will be genetically modified, containing a human gene to reduce the human immune response to pig organs. Some people feel that genetic modification is wrong in itself, regardless of the application and consequences. They worry that mixing genes between different species is unnatural and may lead to the creation of hybrid 'monsters'. Others argue that the transgenic pigs produced only have a tiny change in their genetic make-up and it is very specific.

### ***How can early patients be protected?***

The first xenotransplantation trials will be major and risky operations, and the outcomes will be unknown and unpredictable. It will be impossible to predict, for example, whether a pig kidney will function properly in a human body. It is very important that animal-to-human transplants are offered to patients only when there is a good chance that they will work, and that early patients are protected.

### ***Will animal diseases be passed on to humans?***

There is a small, but real, possibility that xenotransplantation will allow animal diseases to pass into the human population. Someone who required a life-saving operation would probably be prepared to accept a greater risk of infection than that thought to be acceptable for the whole population to be exposed to. The ethical question is how to balance the needs of individual transplant recipients, and the potential benefits to them of xenotransplantation, against the uncertainties associated with the possible transmission of a new infectious disease to the general population.

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### **Ethics Summary**

Ethics is about what we ought or ought not to do. Just because something is technically possible does not mean that we should go ahead and do it.

How do we address an ethical question?

- Get objective and accurate information
- Clarify the definitions
- Use case studies, examples and counter-examples
- Analyse arguments
- Make decisions

There are a number of **ethical frameworks** which help us to work out whether a particular action would be right or wrong. The two main approaches are:

#### **Consequentialism:**

This approach looks at the consequences of an action, and weighs up the benefits and the costs in order to reach a decision. The best course of action is the one which will produce the most overall satisfaction, summed up as “the greatest happiness for the greatest number”. In this approach, the end justifies the means, if the end provides the best likely outcome.

#### **Duties-based approach:**

This approach takes the view that some actions are intrinsically right or wrong in themselves, regardless of the consequences. There can be no exceptions to these duties and rules and so, in this approach, the end can never justify the means (if the means are intrinsically wrong). It is important that a person should be treated as an individual in their own right rather than merely a means to an end.

There are also three **common values**, established in some international codes, which can be used in making moral judgements using any framework.

- **Beneficence**     *do good or slightly differently, do no harm*
- **Autonomy**     *respect for individuals, freedom to make our own choices*
- **Justice**         *fair treatment for everyone*

### ***Animal ideas***

**Sentience:** the capacity of an animal to experience pain and pleasure.

**Speciesism:** The idea that humans have systematically discriminated against animals was first introduced by Peter Singer in the 1970s. It is similar to sexism or racism, as an irrational prejudice that puts the interests of a particular species above the interests of another species for no morally relevant reason.

**Animal rights:** The language of animal rights was introduced by Tom Regan in the 1980s. His suggestion that animals have rights that should not be violated under any circumstances whatever has radical implications when taken to its logical conclusions.

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### **Group One**

Jack Davies, 42, has three children and severe heart disease. Without a heart transplant, doctors think he has only months to live. But no human hearts are available. Jack has the choice of being one of the first human recipients of a heart from a genetically modified pig.

Doctors tell Jack that if he goes ahead with the transplant he is at risk of contracting retroviruses that might be transferred from the pig's heart to his body. But because the procedure is so new they cannot advise him on the actual risks involved. What they do say is that his family could be at risk as well. Without the transplant Jack will die. But with it, his wife, Sylvia and children (aged 5, 10 and 12) might be at risk from an unknown viral infection – which could be life-threatening to them.

- If you were Jack, would you agree to have the transplant?
- If you were a member of Jack's family, would you want him to have the transplant?

#### ***Questions to consider:***

- What precautions should be taken to make sure animal diseases don't pass into the human population? (both during clinical trials and after)
- How should the risk be assessed?
- If we can never say that the risk is zero, does the short-term benefit for the patient pose an unacceptable risk for the rest of the population?
- Currently with human organ donors it is important to make sure that donors are free from infections that might be transmitted to a transplant recipient – are there any differences with the use of animals as organ sources?
- How could you ensure that animals used for transplantation were free from infectious organisms? Would this have any implications for the animals?
- What regulatory mechanisms could be used to limit the risks?
- What should be done in the way of monitoring early recipients?
- What could be done if there are any signs that new infectious diseases are emerging?

#### ***For Feedback:***

- Outline your case study, and decide which issue it is based on.
- Summarise your group's reactions.
- Give details of any decisions reached.

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### **Group Two**

Without a heart transplant, Sonia will probably die before her thirtieth birthday. She is offered the chance of a transplant using a pig's heart. But Sonia is also vegetarian. She believes that animals have interests that should be respected. If she has the transplant, a pig will have suffered and died for her to live. The idea of having an animal's organ living in her body makes her feel really uncomfortable. But there are no suitable human hearts available for Sonia to have a transplant.

- If you were Sonia, would you decide to have the xenotransplant?

#### ***Questions to consider:***

- Is it ethical to use animals to provide 'spare parts' for human beings?  
If not, why not?
- Does the benefit to transplant patients outweigh the suffering caused to the animals?
- Is the use of animals to save lives more acceptable than using them as a source of food?
- Should we treat animals any differently from humans?
- Is a human life more valuable than an animals' life?
- Are there any differences between using pigs and primates as a source of organs?
- Does the use of pigs create particular problems for some religious groups?
- What are the alternatives to using animals?
- Will the animals suffer? How can we minimise the suffering?

#### ***For Feedback:***

- Outline your case study, and decide which issue it is based on.
- Summarise your group's reactions.
- Give details of any decisions reached.

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### **Group Three**

***Andrew Brown:***

Put a human gene into a pig? No, it's like playing God. Mixing genes between different species is wrong, and it interferes with nature. I think it's too risky and it's unnatural - we shouldn't do it. We don't know what kind of hybrid 'monsters' we might end up creating.

***Sarah Awan:***

We've been changing animals for years by selective breeding - genetic modification is no different. Adding a human gene – or, more accurately, a copy of a human gene – into a pig is a tiny change. A pig has tens of thousands of genes and you're only adding one more. I don't see a problem with that.

- What are your views on both these statements? Who do you agree with?

***Questions to consider:***

- Is genetic modification wrong in itself?
- What is 'natural' and 'unnatural'?
- Is there a difference between selective breeding and genetic modification?
- Is it ethical to add human genes to other species in order that we can use their organs as 'spare parts'?
- Does the reason for the genetic modification (for example to provide organs for transplant) have any importance?
- Is a pig with a human gene still a pig? Does GM affect the 'pigness' of the animal?
- Do transgenic animals create particular problems for some religious groups?
- Some people argue that genetic modification is very unpredictable – is it too risky?
- Will transgenic pigs suffer? How can we minimise the suffering?
- Are there potential risks to the environment? How can these be reduced?

***For Feedback:***

- Outline your case study, and decide which issue it is based on.
- Summarise your group's reactions.
- Give details of any decisions you have reached.

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### **Group Four**

Rebecca Anderson, 22, has kidney failure. She has been on dialysis for the last five years, which she describes as half-living. “The novelty soon wore off and was replaced by the slow realisation that I would be a hospital patient for the rest of my life.... no discharge for me EVER.” Now her doctor has offered her the chance of a transplant – using a kidney from a pig. She would be taking part in clinical trials, as one of the first patients to receive an animal-to-human transplant. Her doctor tells her that there would be unknown and unpredictable risks. And, she would have to agree to a whole set of conditions for the rest of her life: never having children, not having unprotected sex, and even having to notify the Health Authorities if she wants to go on holiday abroad.

- Would you agree to have the transplant if you were Rebecca?
- What information would you want to know before deciding whether to join the trial?
- Do you think you would feel differently if it were a heart transplant that you needed?

#### ***Questions to consider:***

- Are patients being used as human guinea pigs?
- When should we start clinical trials involving humans?
- Who should decide when it is safe?
- Who should receive the first transplants?
  - Kidney or heart patients?
  - Very sick patients or relatively healthy ones?
  - Adults or children?
- How can early patients be protected? What safeguards do the first patients need?
- What if the operations do not work, or only half-work leading to a poor quality of life?
- How can you make sure that patients are properly informed? What kind of consent process should be carried out?
- Is it unfair to raise false hopes in patients?
- How will people feel about receiving an animal organ as a transplant?
- What are the consequences of the need for constant health monitoring for the first patients?

#### ***For Feedback:***

- Outline your case study, and decide which issue it is based on.
- Summarise your group’s reactions.
- Give details of any decisions made.

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### **Background information for GROUP 1**

- Many disease-causing organisms are common to human beings and other animals, for example humans and pigs both carry the virus that causes influenza. It would be important to make sure that any animal used to supply organs was free from infectious organisms.
- Animals might also be infected with organisms that do not usually infect other animal species or humans. Xenotransplantation may allow this species barrier to be crossed and xenograft recipients could be infected with previously unknown diseases.
- The HIV virus that causes AIDS is very similar to the simian immunodeficiency viruses (SIV) found in primates – one view suggests that the virus crossed the species barrier from monkeys to humans.
- We know pigs carry porcine endogenous retroviruses (PERVs).
- Viruses may also mutate or recombine with existing human viruses, to form an entirely new pathogen.
- Because xenotransplantation involves the direct introduction of animal organs into a human, many of the natural barriers to infection are by-passed. Xenograft patients are also likely to require immunosuppression to prevent transplant rejection, lowering the body's resistance to disease. This could increase the possibility of infection with animal diseases.
- It is also possible that an animal disease will be able to pass from person to person, and so be transmitted into the human population. It is extremely difficult to assess the level of this risk.
- There are different methods of risk analysis and assessment. One is based on a cost/benefit approach. The other is the principle of precaution. This requires that action should be taken to avoid risks in advance of certainty about their nature. This challenges the view that, until there is evidence that a new technology is harmful, it is acceptable to proceed with its development.

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**VIEWCHART**

I think xenotransplantation is ethically acceptable

I think the ethical arguments either side are balanced

I do not think xenotransplantation is ethically acceptable