Public opinion about xenotransplantation - a FRAME survey

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Introduction:

Between April 2014 and March 2015, 429 patients died waiting for an organ transplant in the UK alone. A further 807 patients were removed from the transplant list as deteriorating health meant that an organ donation would no longer be in the patient's best interest. This would mean that a total of 1,236 people were not found an appropriate organ in time. As of 31st March 2015, 6,973 patients were registered on the ‘active’ transplant list, while an additional 3,375 patients waiting for an organ were no longer eligible. In this same period, 3,322 transplants were carried out thanks to the generosity of 1,282 donors. The lack of donated viable organs has led researchers to discover new methods to obtain organs. One such method is xenotransplantation: growing replacement organs in an animal to replace human organs1.

As the need for organs for use in transplants increases not just in the UK, but around the world, an unlimited source of organs provided by farmed animals seems to be an obvious choice. The first attempted xenotransplantation was as early as 1905, but researchers had little success with many organs being rejected within a few days. It wasn’t until the 1960’s that researchers began to understand that the organ donor species played a role in the rejection response. Researchers also began to think logically about the feasibility of what they were trying to achieve. As great apes are endangered species, the majority of early xenotransplantation studies used baboons and other small monkey species. As adult baboon organs would be unable to cope with the demands of the average adult human body, and the time it takes for monkeys to reach full maturity, the pig was chosen as an alternative2,3.

Humans have been shown to contain antibodies that interact with α-galactose (α-gal), an oligosaccharide expressed on the surface of pig endothelium. When a pig organ is transplanted into a human, the immune system attacks the pig organ leading to organ rejection. To overcome this problem, transgenic pigs were engineered lacking α-gal in the hope that this then hid the organ from the human immune system2.

In March 2014, a team of researchers transplanted a transgenic pig kidney lacking α-gal into a recipient baboon. While the baboon survived for 136 days, the longest survival time for a non-human primate, it died due to septic shock. Despite this, the authors are adamant that there were no signs of organ rejection, but admit that the kidney did increase in size claiming this was due to host growth hormones4.

With xenotransplantation research being undertaken across the world, FRAME wanted to know how the general public feels about the possibility of breeding pigs for humanised organ donation.
Method:

A survey was distributed to people visiting three locations in Nottingham: Kitty Café, University Park Sports Centre and Salon Central. The first section of the questionnaire consisted of eight questions to judge an individual’s views on organ donation and transplantation. The second section consisted of demographic questions. Participants were asked to fill out the questionnaire, but did not have to answer any questions which made them feel uncomfortable. They were able to discuss any questions with which they felt unsure about. Space was provided at the end of the questionnaire for participants to communicate anything else they felt was important and relevant to the survey. The format used allowed for all the questions to be answered in the same way, which allowed for easy analysis.

Results:

Blood donations

The first two questions of the survey were intended to look at the public’s views on blood donation. We felt this was important as it would allow us to see if there were any similarities between how people view blood donation in comparison to organ donation. Of the people surveyed, 19% declared that they have donated blood, but the question fails to distinguish between active donors and those that have donated in the past but no longer do so (figure 1). The question also did distinguish the reasons why the participant has never, or no longer, donates blood as this could be due to a medical, rather than an ethical or religious reason.

![Pie chart showing the percentage of participants who have donated blood.](image)

Figure 1: Pie chart showing the percentage of the participants who have donated blood.

While 81% have never donated blood, 90% of participants would be willing to accept donated blood should they require a blood transfusion (figure 2). As so many
participants are willing to receive donated blood, this indicates that the lack of donation is not due to an ethical or moral issue.

Figure 2: Pie chart showing the percentage of the participants who would accept donated blood.

Organ donation

42% of participants are a registered organ donor, while 10% were unsure about whether they were on the donor register (figure 3). This indicates that the participants are not prevented from being blood donors due to an ethical or religious reason. To be an organ donor is relatively simple, whilst to donate blood can be time consuming requiring people to take time out of a working day.

Figure 3: Pie chart showing the percentage of the participants who are a registered organ donor.
The participants surveyed were also more receptive to receiving a donated organ than being a registered donor (figure 4), with 92% of participants willing to accept a donated organ if necessary. Only 2% of those surveyed would reject a donated human organ, compared to 10% rejecting human blood. The reason for this is unclear and could be due to a bias in the survey group.

Figure 4: Pie chart showing the percentage of the participants who would accept a human organ if they required a transplant.

When asked if the participant would be willing to receive a laboratory grown organ (figure 5), 73% said yes - a decrease of 19% compared to human donation. The maybe responses similarly increased by 17% compared to human donation. This increase in maybe responses indicates that the public lacks the knowledge to make an informed decision.
The survey response regarding xenotransplantation shows a marked increase in the level of no responses, with 1 in 5 participants refusing a humanised animal organ (figure 6). As with laboratory grown organs, the maybe response increases compared to human organ donation to 37%. This is an increase of 31% compared to human organ donation, and a 14% when compared to laboratory grown organs (figure 7). This indicates that while the participants were unsure about how these organs would be produced, other ethical and moral reasons were affecting the outcomes.
If you needed a transplant, would you accept an organ grown in an animal, such as a pig?

![Pie chart showing the percentage of the participants who would be willing to accept a humanised animal organ if they needed a transplant.](image)

**Figure 6:** Pie chart showing the percentage of the participants who would be willing to accept a humanised animal organ if they needed a transplant.

While filling out the questionnaires, many participants asked about how laboratory grown organ and humanised animal organs are produced and whether research is currently ongoing in these fields. Many remarked that they would accept a humanised organ, but do not necessarily agree with xenotransplantation. In this respect, the participants were willing to accept the organ purely because the organ was available at that time. Unfortunately, the question does not go into enough details about why someone may be willing to accept an organ or not.

**Supplementary questions**
As the questionnaire looks at people’s views to organ donation, we felt in necessary to ask if the participants know of any one, or had themselves received an organ (figure 8). 11% of people declared yes to this question, with 6% unsure. This means that the majority of the people surveyed do not know of anyone who has had an organ transplant and this is unlikely to skew the results of the transplantation questions.

Figure 8: Pie chart showing the percentage of the participants who know someone, or have themselves received a donated organ.

33% of people surveyed were not aware that it is illegal for cosmetics which have been tested on animals to be sold in the UK (figure 9). 58% declared that they were aware that it is illegal. However, when talking to the participants, many believed that cosmetic testing on animals had been illegal in the UK since the 80s or 90s. This shows that while many of the respondents thought animal cosmetics tests are illegal, many are unaware of the recent changes in the legislation.

Figure 9: Pie chart showing the percentage of the participants who were aware that it is illegal for cosmetics sold in the UK to have been tested on animals.
Demographics - age and education

56% of the people surveyed fell into the 16-24 age bracket (figure 10). This correlates with the answers given regarding education, with 55% of participants having GCSEs or 6th form/college education which would be expected for the 16-24 age bracket.

**Figure 10:** Pie chart showing the age demographics

**Figure 11:** Pie chart showing the education demographics
age group (figure 11). According to the 2011 UK census 16 % of the population falls into the over 65 category, whilst over 65s account for 6 % of our demographic. The remaining age groups, according to the 2011 census figures, should be equal. The figure shows that our sampling is skewed which may affect the results of the survey.

Demographic- gender and religion

48 % of the participants declared themselves as female, while 46 % were male. This shows, that with respect to gender, our results are balanced (figure 12).

![Figure 12: Pie chart showing the gender demographics](image)

Half of the participants are either agnostic or atheist, followed by 19 % Christian and 13 % other (figure 13). Those that chose other and declared why would have fallen into either the Christian or agnostic/atheist sections. Due to the small scale of the study, no Buddhists, Hindus or Sikh were surveyed.

![Figure 13: Pie chart showing the religion demographics](image)
Demographic - personal ethics

As many researchers who work with animals become desensitised to their work, it was necessary to find out what percentage of our demographic has experimented on animals for research (figure 14). 75 % declared that they have never experimented on animals. 4 % of participants have worked on animals, with 11 % feeling it could be a possibility in the future. Again, this could be due to a survey bias. Over half of our demographic falls into the 16-24 age range, and are likely to be still in education. Those that plan to have a career in the sciences will be aware that some of the work they may be involved in will involve animal research.

![Image of pie chart showing percentages](image1)

**Figure 14:** Pie chart showing the percentage of participants who have experimented on animals.

The majority of people who limit meat consumption do so for ethical reasons (figure 15), with three declaring to be vegetarian, and one being vegan. Others reduced their meat intake in order to reduce meat consumption for health reasons. Some respondents also try to only consume higher welfare meat products. Only two respondents limit meat consumption for religious reasons.

![Image of pie chart showing percentages](image2)

**Figure 15:** Pie chart showing the percentage of participants who limit their meat intake.

Do you limit your meat consumption for ethical or religious reasons?
**Demographic- animal research**

A third of the people surveyed are against animal use in medical research, while a quarter of respondents are for it (figure 16). One maybe responder commented that they believe ‘that although animal experimentation is unethical, it is invaluable for the insight it can reveal and where it is not possible on human I think there is grounds for it. But not for cosmetics,’ while another was only okay for animals to be used if it was not harmful to the animal. One yes responder commented that they agreed with xenotransplantation if it saved human lives. This shows that population is unsure about the use of animals in medical experiments. This could be due to the demographic skew with respect to age- the younger population are likely to have learnt about animal research.

![Pie chart showing whether the participants agree with animal research for medical experiments.](image)

**Figure 16:** Pie chart showing whether the participants agree with animal research for medical experiments.

**Conclusions:**

Our results show that the general population are receptive to human organ donation. However, we can also see that the respondents are unsure about organ donation when the organ comes from a non-human source, such as a lab or a specifically bred animal. When looking at the results, we cannot see any correlation between an individual’s answer and their demographic, such as religion. This could indicate that feelings towards non-human organ donation are based on a lack of understanding rather than an ethical or religious reason.

Many of the participants of the survey wanted to discuss the overarching ethical issues surrounding animal research both during and after filling out the
questionnaire. Considering animal research is generally a taboo subject, we found this surprising. Although, this could be due to the skewed age demographic, with younger age groups more willing to discuss these types of issues.

After conversations with the participants, many were uncomfortable with how the organ was developed with respect to xenotransplantation, but would not refuse the organ if available. This shows that opinions to xenotransplantation are complex and that a more detailed survey should be undertaken to understand the public's opinion in more detail.

References:


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