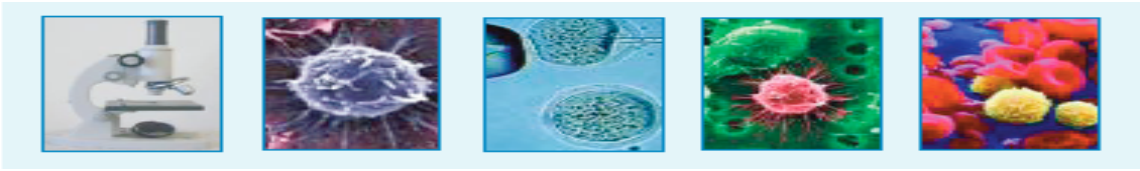


Share Your Views About Creating

Animal-Human Hybrids and Chimeras For Stem Cell Research

Report of a public engagement event held 27 June 2007, Glasgow

Summary

This event was prompted by the *Human Fertilisation and Embryology Authority's* public consultation about the possible creation of animal-human hybrids and chimeras for research, and organised by a University of Edinburgh project team as part of our project "Talking About Stem Cells: The Social Dynamics of Public Engagement in Stem Cell Research".

The event took place in June 2007 in Glasgow, and attracted 17 participants from diverse backgrounds: stem cell science, patient groups, anti-abortion groups, interested members of the public, HFEA, social science, biotechnology companies and law. The format included small group discussions followed by a question and answer sessions with an expert panel. Both stages were lively, allowing people to learn about and discuss the complex issues involved. The views expressed were diverse. In many cases, there are strong links between people's views on the different possible sources. For example, anti-abortion campaigners oppose the use of *any* embryos in research, including animal-human embryos.

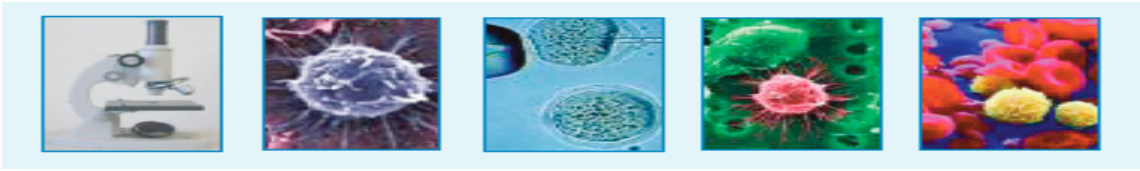
Because the use of animal eggs is being considered as an alternative to using human eggs and embryos in stem cell research (SCR), we first asked participants to consider their views of sourcing embryos solely from humans before talking about using animal sources. The majority of participants supported the use of 'spare' embryos donated from IVF treatment. By contrast, many were concerned about the use of 'egg sharing', where women undergoing IVF donate some of their eggs in return for a reduction in the cost of the treatment, on the grounds that this financial incentive compromises informed consent. The main concern with 'altruistic donation' is that the procedure for obtaining eggs is very invasive and would not otherwise be undertaken (in contrast to women undergoing IVF). However, some felt that more women would be willing to donate their eggs if there had been fuller debate about the issues. Two research nurses felt that the use of human embryos and eggs is far preferable to the use of animal sources because there is no possibility of animals 'consenting'.

Scientists want to create cytoplasmic animal-human embryos in which a human nucleus is inserted into the shell of an animal egg. Views on this varied. Some find the mixing of human and animal genetic material inherently unsettling. Others who do not oppose creating these kinds of embryos, felt that using non-human primates for creating cytoplasmic animal-human embryos is wrong. For scientists and non-scientists alike, using embryos from small animals, such as mice and rabbits, is less worrisome. The status of these embryos is not clear – are they human, animal or neither? Many felt that the relative proportion of human to animal DNA (99% and 1% respectively) is not very meaningful. Most scientists present viewed these embryos as essentially a research tool, to be used in the development of new therapies but not used *as* therapies. All participants agreed that research on these embryos should be subject to the same regulatory restrictions as human embryos: that they should not be kept alive beyond the 14 day limit.

Although 'true' animal-human hybrids have in the past been produced in one laboratory test for IVF, none of the scientists present could imagine how these could be useful. The creation of chimeras arises with current practice of inserting human stem cells into an early animal embryo in order to test whether

the human stem cells created functional tissue types such as nerve, muscle or brain. It was felt that wider publics would be concerned about what particular cells are being inserted, and between what animals. For instance, placing human neural stem cells into an animal embryo to see if they become functional is troubling because the intellectual capacity of humans could be transferred to animals, thus humanising animals too much.

Finally, participants raised a number of misgivings about the HFEA consultation and about consultation processes in general.



Share Your Views About Creating

Animal-Human Hybrids and Chimeras For Stem Cell Research

Report of a public engagement event held 27 June 2007, Glasgow

Background to our event

Prompted by the *Human Fertilisation and Embryology Authority's* public consultation about the possible creation of animal-human hybrids and chimeras for research, a University of Edinburgh research team organised and ran a public event as part of the project "Talking About Stem Cells: The Social Dynamics of Public Engagement in Stem Cell Research".

The event adopted a three staged format of (1) a short presentation by Sarah Parry outlining the aims of our project and of the HFEA consultation on hybrids and chimeras; (2) small discussion groups; followed by (3) an informal question and answer session with five people who brought different areas of expertise: three stem cell scientists, one social scientist with an active interest in both stem cell research and animal research, and the head of regulation and policy for the HFEA. In the small discussion groups, participants were asked to consider four areas relating to animal-human hybrids and chimeras. These were existing sources of embryos, the creation of cytoplasmic hybrid embryos, the creation of other kinds of hybrids and chimeras, and views of the consultation process. Discussion of these different issues was used to identify key questions to bring to the question and answer session.

Attended by 17 people, the event was held on June 27th 2007 at The Mitchell Library, Glasgow. Participants came from varied backgrounds including patient groups, interested members of the public, stem cell scientists, HFEA, anti-abortion campaigner, biotechnology industry, social science and law. In each group, two social scientists facilitated the discussion and at least one stem cell scientist helped to answer any technical questions that arose along with participating in the conversation.

Our feedback and evaluation confirmed that the event was successful in that it prompted lively discussion in both the small groups and plenary, allowing people to learn about and discuss the complex issues generated by the possible creation of animal-human hybrids and chimeras. As with other events we have run, we felt that the time passed very quickly. Also, we had hoped to gain a wider spectrum of participants than was achieved. We had particularly hoped to encourage the attendance of somebody who could speak about the experiences of donating eggs and/or embryos in the context of fertility treatment. The timing of the event, to coincide with the HFEA consultation, meant that many people were on holiday.

In this summary, we provide a brief outline of the issues raised in the three small discussion groups and during the informal question and answer session. As expected, there are both commonalities and differences between the small groups regarding the level of attention paid to different aspects of these issues and the specific areas addressed.

Meanings of "spare" IVF embryos

Discussions about researchers using embryos created for the purpose of IVF treatment but then donated for stem cell research (SCR) sparked polarised responses. The majority of participants support using 'discarded' or 'leftover' embryos from IVF. One research nurse, who supports using 'spare' embryos, suggests that the term 'embryo' often evokes emotive images of a fully formed fetus. For the

anti-abortion campaigners, who hold the view that all embryos should be accorded the full status of human life, using any embryo for SCR is considered unacceptable.

In one group one, the conversation about 'spare' embryos evoked a discussion about what 'spare' actually means. One stem cell scientist with experience of working with human embryos for SCR feels that it is misleading to talk about spare embryos for SCR because those embryos donated for research purposes are poor quality and therefore cannot be used for fertility treatment anyway. In response, a research nurse questioned whether this is always the case and pointed out that some embryos donated to SCR may be graded as good enough for fertility treatment, although they weren't graded as 'the best' embryos and subsequently weren't used for that particular treatment cycle. The point is that not all embryos created as part of fertility treatment but then donated to SCR are *the same*.

Informed consent

Issues about informed consent for obtaining both human eggs and embryos were raised in two groups. Specifically, informed consent was considered by some to be compromised in a number of situations. For example, one clinician has concerns regarding 'egg sharing'. Egg sharing involves a financial incentive where couples receive IVF at reduced rate in return for a woman 'sharing' (i.e., donating) half of her eggs for SCR. He believes that the financial incentive might compromise the possibility of obtaining 'informed consent'. Similarly, a stem cell scientist extended concerns regarding coercion to include poor women in other countries. A stem cell scientist in another group is supportive of 'egg sharing', but raised questions about 'altruistic donation'. He believes that the financial incentive for 'altruistic donation' encourages women to undergo a risky procedure who would not ordinarily expose themselves to such risks. A further concern is the potential pressures on women scientists being encouraged to donate their eggs for research in the laboratory they work in. People feel informed consent is compromised in both contexts because women are subject to coercion either by senior colleagues or by payment mechanisms.

In spite of the recognised limitations of obtaining informed consent, others put more store by it. Instead of referring to 'informed consent', one group found the idea of 'valid consent' compelling. As a clinician in this group explained, this involves providing enough information to the patient in order for the person obtaining consent to feel 'comfortable' with the patients' decision. Research nurses in groups one and two were more comfortable with obtaining eggs from women for SCR than from animals precisely because women can give or withhold their consent; animals can't.

Creating human embryos using SCNT (using a woman's egg and a human nucleus)

One potential method for creating human embryos is to use the somatic cell nuclear transfer (SCNT) technique with women's eggs. This involves asking women to donate some eggs to SCR. The nucleus from the egg is removed and replaced with that nucleus from another human cell. Using a small electrical current fertilisation is then stimulated. The creation of human embryos using the SCNT technique, involving only human cells, raised a variety of responses.

Members of one group felt that the question of whether the public actually supports, or otherwise, using women's eggs to create SCNT embryos for SCR has yet to be properly publicly debated. According to a research nurse and an interested member of the public, we tend to underestimate the number of people willing to donate tissue of all kinds to medical research. However, the overall view was that the issues surrounding two forms of egg donation – egg sharing and altruistic donation – has not received the attention of a comprehensive public debate but instead has solicited only a narrow range of views. For one research nurse the implication of this argument is that we cannot justify using animal eggs using the claim that there is a shortage of human eggs for SCR because we don't know whether women will donate eggs or not.

In another group where all but one participant (an anti-abortion campaigner) supports creating human embryos using SCNT (i.e. human eggs with a human nucleus), 'egg sharing' is not wholeheartedly accepted. As indicated in the previous section, one stem cell scientist suggested that the financial incentives used in 'egg sharing' might compromise informed consent because the decision to donate could be driven by the need to pay for treatment. He went on to suggest that an international 'market' for eggs might emerge where women in poorer countries are exploited, exchanging their eggs for

financial gain. However, a member of the HFEA pointed out that eggs imported to the UK are regulated and licensed by the HFEA, and participants in this group were subsequently satisfied that this would protect such women.

Views of 'altruistic donation' were also diverse. The term altruistic donation is used to describe women who undergo ovarian stimulation in order to donate eggs solely for research purposes (i.e. women who are not part of an IVF programme). Their eggs are then fertilised using the SCNT technique, with a nucleus from human cells. A member of the HFEA pointed out that the regulatory body has decided that if it is acceptable for women to donate eggs to another couple to use for fertility treatment then it is ethically consistent to permit donating eggs for research purposes: it is a woman's right to choose. That said, from one woman's perspective – a stem cell scientist – donating eggs specifically for research is too invasive for her to personally consider participating. However, she does not hold a principled objection to altruistic donation by others. Similarly, as already indicated above, the invasiveness of the technique and financial incentives led one male stem cell scientist, to find 'altruistic donation' an uncomfortable development. Conversely, he finds both 'egg sharing' and using embryos created for IVF acceptable because the woman would be undergoing ovarian stimulation as part of the process and disposing of embryos is wasteful. One member of the public, a woman who strongly supports this research, said that she would donate her eggs, but only after she had had children. At the other end of the spectrum, one woman working for an organising that lobbies to protect the 'unborn child' holds the view that all embryos should be considered a life and, therefore, using women's eggs to create embryos for anything other than trying to conceive a child lacks respect for early human beings.

Finally, one male stem cell scientist is particularly uncomfortable with the idea of using embryos for research that are created by obtaining eggs and fertilising them with donated sperm. As above, this is because the resulting embryo is ostensibly a 'healthy' embryo that was created specifically for the goal of research, using sperm from a man unknown to the female egg donor, rather than unused embryos created for fertility treatment. Because the use of the SCNT technique through either 'egg sharing' or 'altruistic donation' does not use sperm then this does not involve creating embryos that are considered 'healthy' or usable in conceiving a child. In this sense, the technique used to create an embryo appears to shape some people's views of the acceptability of using them in research or reproductive medicine.

Creating cytoplasmic animal-human embryos

Views about creating cytoplasmic embryos using animal eggs and a human nucleus were varied. Two participants (in separate groups) who are practicing research nurses said that they wouldn't work on a research project involving animal-human mixing, including creating cytoplasmic animal-human embryos. In addition to the 'in principle' objection to combining human and non-human DNA, one nurse feels that the inability of animals to give their consent (or refuse it) contributes to the unacceptability of this research.

During the discussion in the third group, one stem cell scientist was surprised to hear that cytoplasmic animal-human embryos were considered unethical by the anti-abortion campaigner. Whereas the stem cell scientist feels that cytoplasmic animal-human hybrid embryos are ethical because they do not involve either women's bodies or IVF embryos, the anti-abortion campaigner finds these 'new' types of embryo disrespectful. Here, she argued that what is special to humans – their DNA – is combined with animal cells and is, therefore, unacceptable. In this sense, participants wondered whether the HFEA recognise cytoplasmic animal-human embryos as human or not?

We also found that, for those people who do not oppose creating these kinds of embryos, it matters what type of animal is to be used for this research. A number of participants feel that using non-human primates for creating cytoplasmic animal-human embryos is wrong. A stem cell scientist in groups one argued the small number of eggs that can be obtained from non-human primates compared to small animals (e.g. mice or rabbits), the financial expense, and the similarities between human and non-human primates generate an indefinable aversion for not favouring the involvement of non-human primates. Similarly, one stem cell scientist in group three would not work with eggs procured from non-human primates because the egg retrieval technique is too invasive compared to the small number of eggs that could be obtained. This view of echoed by a participant who works in the biotechnology industry who also has experience of conducting animal research. Small animals such as mice and rabbits, however, are less worrisome.

Using stem cells from human-animal embryos for human therapies

Based on current knowledge, one stem cell scientists feels that stem cells stem cells derived from human-animal embryos will never be used directly in human therapies. The risk of cross-species contamination was raised as particularly worrying. It was noted by a research nurse in group three that many SCR projects are working towards removing animal products from stem cell lines, finding ways around using animal products in the various stages of SCR. The representative from a biotechnology industry organisation added that there are commercial drivers for removing animal products from stem cell lines: the presence of animal products will hinder the development of therapeutic products.

Conversely, one stem cell scientist in group two claimed that cell lines created from cytoplasmic animal-hybrid embryos are 'basically human'. From this perspective, these embryos were considered a good alternative to 'fully' human embryos for producing cell types to be used in treatments for human diseases. As he explained, because of the moral status of human eggs and their scarcity, then it is important to have high efficiency rates in creating stem cell lines out of human embryos (which scientists currently do not). However, with animal eggs, the issue of efficiency is less of a concern because animal eggs (i.e. rabbits) are more readily available.

A clinician questioned the scientists' view that cytoplasmic animal-human embryos are 'basically human'. He argued that we need to know exactly what contribution the animal cytoplasm is making to the whole; indeed, he felt that distinguishing the animal part from the human part is impossible.

As a research tool

The purpose of creating human-animal embryos, according to some, is to develop techniques and to gain knowledge that will contribute towards therapeutic benefit for humans. This might include improving efficiency rates in creating embryos using the SCNT technique, as a disease model for understanding particular illnesses, learn how to obtain stem cell lines, to develop an appropriate growing medium, and control stem cells in order to obtain specific cell types. However, it was felt that greater understanding of stem cells and the development of derivation techniques for obtaining stem cells from embryos and growing them in the laboratory gained by working with human-animal embryos must then be applied to 'fully' human embryos.

As indicated above, a representative from a biotechnology industry organisation pointed out that in order to commercialise this area through the development of human therapeutic applications that the cells must be 100% human. Again, this reiterated the need to use animal-human embryos as research tools only.

Are interspecies embryos animal, human or both?

As noted above, one stem cell scientist described cytoplasmic animal-human embryos as 'basically human'. Because of the small quantity of animal genetic material contained within the egg's mitochondria (about 1%) and knowledge of its role in a biological organism (to generate the cell's energy), then this is sufficient to consider such an embryo as human.

For other participants, embryos created using an animal egg and a human nucleus are not considered human embryos precisely because they have an animal component, however small. As one stem cell scientist argued, cytoplasmic animal-human embryos are neither human nor animal. They are something else. Because of being classified as non-human, they are thought to be *more* publicly acceptable than using either spare IVF embryos or asking women to donate eggs for SCNT.

For the research nurses in particular, mixing animal and human genetic material is inherently unsettling and makes them uncomfortable. They would prefer to see scientists find ways to develop their research using human eggs and spare IVF embryos and to allow the supply of these eggs and embryos to determine the speed of SCR.

Participants in all groups questioned whether we could ever know how human or animal hybrid/chimera embryos are. Figures, such as "99% human, 1% animal" were not thought to be testable. As one social scientist pointed out, 1% is often used to describe the percentage difference between humans and other species. For example, we share around 98% of our DNA with chimpanzees and around 50% with

a cabbage. Similarly, one patient member suggested it is more important to know what role the 1% DNA plays in the body rather than focussing on the percentage figure per se. This view was also raised in another group by a member of the public. A clinician further argued that humanness is accessed in different ways to codified scientific knowledge – that is, humanness is more intangible or experiential such as sentience and consciousness. In this context, it then becomes difficult to say what it means for an animal-human cytoplasmic embryo to be 99% human and 1% animal.

In the case of hybrids and chimeras, drawing distinctions between humans and animals was found to be troubling. The discussion in group two led to the view that some animal-human embryos were considered more 'horrible' or 'frightening' than others - notably if the egg used comes from a non-human primate. Here, the clinician argued that mixing non-human primates with humans was considered a 'special crossing' that troubles definitions of 'human' and 'animal' because they are too close to be distinguished on the basis of sentience or consciousness.

Maintaining the 14-day limit

The need to maintain the 14-day limit (where embryos cannot be grown beyond 14-days in the UK) was considered essential by participants. The uncertainty about defining hybrid and chimera animal-human embryos as human, animal or a mix of the two and concerns about what any entity would be if allowed to develop into a fetus or live being means that the 14-day limit is an important end point to any research in this area. For instance, the right to life campaigner suggested that if we do not consider animal-human embryos as human then this potentially changes how those embryos are regulated. If considered human, then the 14-day limit – as enforced by the HFEA – applies. But if considered animal or not fully human then this ethical dilemma in turn creates a regulatory dilemma where the 14-day limit may be challenged. The potential for changes in how cytoplasmic animal-human embryos are defined and therefore regulated – specifically the removal of the 14-day limit – was a concern.

True animal-human & animal-animal hybrids

In two groups and in the final plenary, the use of the 'hamster egg penetration test' was raised as an existing example of creating 'true animal-human hybrids'. This test has been used as in IVF to diagnose male infertility by testing whether a human sperm is able to fertilise a hamster egg in a dish. It was pointed out by a stem cell scientist who has previous conducted this test that the resulting embryos are 'true hybrids' because they have been shown to have half their chromosomes from human (the sperm) and half from hamster (the egg). Current regulation states that hamster-human hybrid embryos must be destroyed within 48 hours/two-cell stage, which means that they can't be used to create stem cells because this requires a 4-5 day-old embryo (having up to 150 cells). Although the 'hamster test' is permitted in the UK, a representative of the HFEA pointed out that there are no active licenses for this test at present.

As already shown, a number of people held a principled objection to the mixing of human and animal cells in embryo research. Significantly, even for those who didn't object in principle, other than the 'hamster test' (now clinically redundant), none of our participants could identify a specific 'good' scientific reason to create 'true animal-human hybrids' using the gametes of two different species. However, the notion that it might in some way be useful to research was raised, but participants wanted to hear reasons for creating a true hybrid. One member of the public distinguished acceptability of 'true animal-human hybrids' according to the intention of such practices: it is acceptable for basic research but not for applied research. Notably, none of the stem cell scientists could imagine how 'true animal-human hybrids' could be useful. And for those who find the creation of true animal-human hybrids potentially acceptable (providing there is a good scientific justification) then the need to maintain the 14-day limit is firmly a held belief.

It is perhaps unsurprising, then, that animal-animal 'true hybrids' were discussed by way of comparison. In group one the creation of horse-donkey 'true hybrids' was discussed, with both scientists and members of the public noting the biological errors that occur when the chromosomes of two species do not pair up properly during development (a process call meiosis). As was outlined, the result of this biological error is that donkey-horse hybrids are infertile.

Creating chimeras

Participants in two of the groups discussed the issues arising from inserting animal cells, genes or tissue into a human being, or visa versa. For example, a stem cell scientist in group two cited the use of pig valves in humans as an existing practice involving animal-to-human transplantation that results in a chimera.

Participants also discussed the insertion of human stem cells into an early animal embryo in order to test whether the human stem cells created functional tissue types such as nerve, muscle or brain – again, an existing practice in SCR. It was pointed out by two stem cell scientists that to conduct this experiment the other way around (putting animal stem cells into an early human embryo) would not take place because it would be considered a waste of a human embryo.

Participants in one group, discussed how it matters to the wider public what cells in particular are being inserted, and between what animals. For instance, a clinician argued that placing human genes into a pig to 'progressively humanise' it's immune system in order to use pigs as a source of organs for transplantation is accepted by the public. Placing genes from, for example, an elephant into a mouse, however, would raise public concern because the animals are incommensurate. Beyond the lack of parity in terms of scale between animals, another concern relates to the cells being inserted. Placing human neural stem cells into an animal embryo to see if they become functional is also troubling because the intellectual capacity of humans could be transferred to animals, thus humanising animals too much.

Consultation processes

Questions were raised about the HFEA consultation process, with many participants asking for further clarification about who is consulted, whether scientific journals are looked at, how decisions are arrived at on the basis of consultation processes, whether the views of participants will be made public and how the HFEA will assess whether research is acceptable or not. It was clear that many participants were unclear as to how a consultation exercise fits in with the broader political process. Some members of the public feel frustrated or anxious about such processes and the sense that their views will be dismissed because it isn't a referendum. Indeed, there was a suggestion that the HFEA will consult the public even though the decision has already been made to go ahead. In this regard, there was a call by one member of the public for a publicly available record of the views that have been expressed.

Participants also noted the difficulties involved in conducting a successful consultation. One group discussed the problems with alerting people to the HFEA consultation and getting a wider public interested enough in the topic to respond. Barriers to getting people engaged are both a lack of knowledge of the topic at hand and a seeming lack of relevance to people's lives if they don't have an obvious vested interest. Here, participants in all three groups noted the role of the media in generating anxiety and controversy through their reporting of 'scare stories' along with a lack in-depth, high quality science reporting that is seen in the United States.

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Although we were unable to cover in this report all the points raised by participants, we hope that this event will have prompted further interest in the topic and in participating in further public engagement activities. On the evening of 16th April, in Edinburgh, we will be holding a large event addressing different sources of stem cells, which will pull together the results of earlier discussions and provide an opportunity to think about proportionately how much funding should go to each. If you have any comments on the issues raised about the use of animal-human embryos in research, or on the event itself, we warmly invite you to send us your thoughts either in writing or by email to the address at the bottom.

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APPENDIX

The regulatory process so far

November 2006
The *Human Fertilisation and Embryology Authority* received two research applications to create human/animal embryos. One from Dr Majlinda Lako, Centre for Stem Cell Biology & Developmental genetics, Institute of Human Genetics, University of Newcastle Upon Tyne and another from Dr Stephen Minger, Stem cell Biology Laboratory Wolfson Centre for Age-Related Diseases, King's College London. Both applications propose to create embryos using animal oocytes (eggs) and the nucleus from a human cell – creating so-called 'cybrid' embryos.

December 2006
The Department of Health published a White Paper, *Review of the Human Fertilisation and Embryology Act*. In this document the creation of animal-human embryos was discussed and the Government proposed that this should not be allowed. However, they also proposed that the regulatory body (HFEA) should have the power to set out circumstances in which this may be allowed in future, under license.

January 2007
The *Human Fertilisation and Embryology Authority* deferred its decision on whether to license the two applications it had received, stating: 'there needs to be a full and proper public debate and consultation as to whether, in principle, licences for these sorts of research could be granted … There is not clear agreement within the scientific community about the need for and benefits of this science' (HFEA, Jan 2007).

January to April 2007
In response to the two research applications and the Government's White Paper (December 2006), the *House of Commons Science and Technology Committee* conducted their own inquiry into the Government proposals to prohibit the creation of human-animal chimera or hybrid embryos for research for the time being. Their inquiry invited written evidence, held private seminars with stem cell scientists, three oral sessions with invited experts, and one public seminar. This inquiry culminated in a published report in April 2007 where the *House of Commons Science and Technology Committee* stated their support for human-animal hybrids and chimeras. The Committee were also critical of the HFEA in delaying a public consultation, but commended the fact that it was happening.

April to July 2007
The *Human Fertilisation and Embryology Authority* held a public consultation inviting people to respond to a series of questions via an online questionnaire.

May 2007
The Department of Health published its Draft Bill on *Human Tissues and Embryos*. The Draft Bill proposed to permit, subject to receiving a licence from the HFEA, creating embryos using an animal oocyte (egg) and human nucleus – 'cybrid' embryos. 'True' hybrid embryos – created by fertilising an animal egg with a human sperm, or visa versa – would be banned unless permitted by further regulation.

August 2007
The *House of Lords and House of Commons Joint Committee* published their Human Tissue and Embryos (Draft) Bill. Here, the Government questioned the different between 'cybrids' (also known as 'cytoplasmic hybrid embryos') and 'true' hybrids. As a result, they recommended that 'the HFEA should be left to judge whether entities may be created, kept and used for research purposes under license'. Difficulties in defining the boundary between human and animal when DNA is mixed in origin led to difficulties in how to regulate such entities. In practice, this means that licensing animal-human hybrids will be at the HFEA's discretion. Additionally, the Government's previous plan to merge the HFEA and

the Human Tissue Authority to form RATE (the Regulatory Authority for Tissue and Embryos) has been abandoned.

Autumn 2007
The House of Lords and House of Commons Joint Committee has recommended the creation and use of inter-species embryos for research purposes be put to a free vote in both Parliamentary Houses (i.e. Lords and Commons).

References

Department of Health (2006) *Review of the Human Fertilisation and Embryology Act: proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)*, 14 December 2006 http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_073098

Department of Health (2007) *Human Tissues and Embryos (Draft) Bill*, 17 May 2007, http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsLegislation/DH_074718

House of Commons Science and Technology Committee (2007) *Government Proposals for the Regulation of Hybrid and Chimera Embryos*, Fifth Report of Session 2006-2007, 05 April 2007, http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/272/272i.pdf

The House of Lords and House of Commons Joint Committee (2007) *Human Tissue and Embryos (Draft) Bill*, Session 2006-2007, 01 August 2007, http://www.publications.parliament.uk/pa/jt200607/jtselect/jtembryos/169/169.pdf

Human Fertilisation and Embryology Authority (2007) *Press Statement Regarding Human-Animal Hybrid Research*, 11 January 2007 http://www.hfea.gov.uk/en/1478.html

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