Animal-human Embryonic Combinations: An Ethical Discussion

CiS London Conference

4 November 2006

Dr. Calum MacKellar

Scottish Council on Human Bioethics

CROSSING THE SPECIES BARRIER

Australian artist Patrician Piccinini entitled ”The Young Family"

I want a new invincible human being, insensitive to pain, resistant and indifferent about the quality of food they eat.

President's Council on Bioethics of the USA:

Reproduction and Responsibility: The Regulation of New Biotechnologies (2004)

President's Council on Bioethics of the USA:

Reproduction and Responsibility: The Regulation of New Biotechnologies (2004)

- No fertilisation of human eggs by animal sperm

- No insertion of human embryos into the bodies of animals

UK House of Commons Science and Technology Committee:

Human Reproductive Technologies and the Law (2005)

"***While there is revulsion in some quarters that such creations appear to blur the distinction between animals and humans, it could be argued that they are less human than, and therefore pose fewer ethical problems for research than fully human embryos.***"

Legislation:

- International Legislation

Legislation:

- International Legislation
- National Legislation
    - Canada: Assisted Human Reproduction Act 2004
    - Australia: Prohibition of Human Cloning Act 2002
    - USA: Draft Human Chimera Prohibition Act of 2005
    - Human Fertilisation and Embryology Act (1990)

Legislation:

- International Legislation
- National Legislation
    - Canada: Assisted Human Reproduction Act 2004
    - Australia: Prohibition of Human Cloning Act 2002
    - USA: Draft Human Chimera Prohibition Act of 2005
    - Human Fertilisation and Embryology Act (1990)
- Patent Regulations

Ethical Issues

Issues relating to:

- **Human Dignity**
- **Human Identity**
- **Acceptable limits**
- **Importance of certain body parts**

Transfer of brain cells between humans and animal

Transfer of human brain stem cells to animals

USA Interdisciplinary Working Group (2005):

- Proportion of engrafted human stem cells,
- Stage of neural development of the animal,
- Animal species,
- Brain size of the animal,
- Site of integration into the animal brain of the human brain stem cells,
- Brain pathology of the animal.

The transfer of reproductive cells between humans and animals

Psycho-social Risks

Psycho-social Risks

Biomedical Risks:

- Risks of biological developmental problems

- Risks of creating new diseases

Psycho-social Risks

Biomedical Risks:

- Risks of biological developmental problems

- Risks of creating new diseases

Unnaturalness

Psycho-social Risks

Biomedical Risks:

- Risks of biological developmental problems

- Risks of creating new diseases

Unnaturalness

Animal Rights

Ethics - Society can:

- Decide not to create certain kinds of animal-human entities.

- Decide to create certain kinds of animal-human entities and kill them or let them die before they develop to any advanced stage.

- Decide to create certain kinds of animal-human mixtures and allow them to develop.

Recommendation:

In so far as it is possible, a decision should be taken to determine whether a created animal-human entity should come under animal or human legislation.

Animal-Human Transgenesis

Animal-Human Transgenesis

Recommendation:

The creation of animal-human transgenic animals in which some foreign human genes are deliberately inserted into the genome of animals should only proceed with extreme caution.

Animal-Human Gestation

Animal-Human Gestation

UK House of Commons Science and Technology Committee:

Human Reproductive Technologies and the Law (2005)

"***It could be argued that if incubation of [a surplus human] embryo in an animal were to yield value information about the causes of infertility, then this is an appropriate use of the embryo and consistent with its status.***"

Recommendation:

- The placing of a live human embryo into an animal should be prohibited.

- The placing of live human sperm into an animal should be prohibited.

- The placing of a live animal embryo into a woman should be prohibited.

- The placing of live animal sperm into a woman should be prohibited.

Animal-Human Hybrid Embryos:

A biological organism created through the general use of eggs and sperm cells of different animal and human origins.

Embryo containing cells made up of both human and animal chromosomes

Embryo containing cells made up of both human and animal chromosomes

Recommendation: ***Should be prohibited.***

Non-human eggs stripped of their chromosomes into which human nuclei are inserted

BBC News: 12 January 2006

Animal eggs 'to grow stem cells'

Stem cell researchers in the UK are looking to use animal eggs as "hosts" to grow human cells.

http://news.bbc.co.uk/1/hi/health/4605926.stm

Recommendation:

Agrees with UK Government Response (2000) to Recommendations made in the Report:
"Stem Cell Research: Medical Progress with Responsibility":

"***The mixing of human adult (somatic) cells with the live eggs of any animal species should not be permitted.***"

Mixing of Animal and Human Gametes

Mixing of Animal and Human Gametes

Recommendation:

The mixing of animal and human gametes should be prohibited.

Animal-Human Chimera:

A biological organism that is made up of genetically distinct population of animal and human cells.

Xenotransplantation

Xenotransplantation

Recommendation:

This should only take place if it the procedure respects all national and international legal instruments.

Animal-Human Embryonic and Fetal Chimeras

Developments:

- Small sections of quail fetus brain transplanted into chicken fetus brain (1997):
Chickens exhibited quail vocal trills and head bobs.

Animal-Human Embryonic and Fetal Chimeras

Developments:

- Small sections of quail fetus brain transplanted into chicken fetus brain (1997):
Chickens exhibited quail vocal trills and head bobs.

- Discovery of human embryonic stem cells in 1998.

Stem cells: **- Give rise to specialised cells**
- Divide for an indefinite period of time

Mixing human pluripotent cells with animal embryos:

US National Academy of Sciences in 2005:

- Are human pluripotent stem cells required?

- Has sufficient animal work preceded the proposed work?

- If human pluripotent stem cells are transferred into an animal embryo or fetus, have studies shown that the creature would not have ethically unacceptable characteristics?

- If visible human characteristics arise, have all those involved in these experiments been informed and educated about this?

Incorporation of Human Stem Cells into Post-natal Animals

Incorporation of Human Stem Cells into Post-natal Animals

Recommendation:

This should only take place if it can be demonstrated that the cells cannot contribute to the germline or give rise to specifically human brain functions in the animals.

Incorporation of Human Pluripotent Stem Cells into Post-blastocyst Stages of Non-Human Animal Embryos

Incorporation of Human Pluripotent Stem Cells into Post-blastocyst Stages of Non-Human Animal Embryos

Recommendation:

This should only take place if it can be demonstrated that they cannot contribute to the germline or brain cells of the animal.

Incorporation of Human Pluripotent Stem Cells into Non-Human Blastocysts

Incorporation of Human Pluripotent Stem Cells into Non-Human Blastocysts

Recommendation:

This should be prohibited.

For more information go to:

www.schb.org.uk