Regulate research at the animal–human interface

The time is right, says **Martin Bobrow**, to improve the governance of research involving animals that contain human genetic or cellular material.

Chinese scientists have introduced human stem cells into goat fetuses, producing animals with organs that contain functioning human-derived cells[1]. US scientists have examined the ethics of creating a mouse that has some human-derived brain cells (although they have not done the experiment)[2]. Many thousands of transgenic rodents, inter-species cell lines and animals grafted with human tissue have been created worldwide, and have helped substantially with the investigation of health and disease and the development and testing of therapies.

But few countries have specifically considered the governance of research involving animals that contain human material (ACHM), and the topic has had little public discussion. Potentially controversial science proceeds best in an open environment. Britain has an enviable record of reasonably harmonious research in human embryology owing to parliamentary debate, legislation and regulators who systematically engage the public. However, violent opposition to animal research has sometimes hampered open discussion. We hope that era is behind us, and the opportunity for inclusive discussion of these more subtle issues can be grasped.

And it must be grasped, because in Britain at least, there is a regulatory discontinuity. Research with embryos that contain animal material but are judged by regulators to be 'predominantly human', is subject to stringent scrutiny and authorization by the Human Fertilisation and Embryology Authority (HFEA). The HFEA takes account of scientific, medical, ethical and social issues, and frequently consults the public on emerging techniques. A similar chimaeric embryo with marginally less human material judged 'predominantly animal', however, is regulated by the Home Office in consultation with the Animal Procedures Committee under legislation intended to protect animal welfare. In mammals, this regulation becomes applicable at the midpoint of gestation.

The lack of a formal working interface between these two systems creates uncertainty for scientists requiring regulatory approval for their work. It could also allow sensitive experiments to be done legally but without expert ethical scrutiny.

To help bridge this regulatory boundary, on 22 July, the Academy of Medical Sciences in London published a report[3] of a working group that I chaired. The report recommends where the ethical limits of such methods may lie, and what governance is needed. We hope that it will catalyse the development of international standards and guidelines by collaboration among regulators, policymakers, bioethics bodies, funders of medical research and the research community.

AP PHOTO/R. PEDRONCELLI

Enzymes in the milk of this genetically altered goat will combat diarrhoea-causing bacteria.

SENSITIVE AREAS

To inform the report, the academy commissioned a public dialogue that involved more than a thousand people[4]. Most participants supported ACHM research that is aimed at better understanding or treating human disease. But three areas of sensitivity emerged: modifications of the animal brain that are likely to lead to human-like cerebral function; experiments that could lead to functional human gametes in an animal (especially if the gametes might be fertilized); and modifications to an animal that create features perceived as uniquely human, such as facial shape, skin texture or speech.

For ACHM, the academy recommends a similar regulatory structure to that proposed internationally for human stem-cell research. First, the great majority of experiments are uncontentious and should undergo standard ethical and regulatory review. Second, proposed experiments that approach these areas of sensitivity should be scrutinized by a national expert multidisciplinary body that also advises on more general aspects of animal research. Such sensitive research should proceed in incremental steps, with regular dialogue between researchers and regulators. Third, a very limited number of studies should not currently be undertaken because they raise very strong ethical concerns or lack sufficient scientific justification.

UK research regulations must be revised by 2012 to transpose the European Directive on the protection of animals used for scientific purposes into UK law. At the same time, the UK government is reducing the number of its public agencies (including, perhaps, the HFEA). We hope the Home Office will take this opportunity to reshape the Animal Procedures Committee into a body with a remit to provide guidance on these ethically and socially sensitive kinds of research. Recognizing that an effective regulatory system must not needlessly hamper potentially beneficial science, we recommend that this body should be sufficiently flexible and consultative to adapt to evolving scientific knowledge and social attitudes.

Securing a robust, forward-looking regulatory framework for ACHM would promote Britain's position as a responsible home for cutting-edge science. But science is an international endeavour. Other countries must follow suit. Consistency in regulation and governance promotes constructive multinational collaboration and ethically responsible research, as the human-stem-cell research community is demonstrating through the production of common guidelines. The harmonization of animal-research regulations across Europe provides a stimulus to begin a similar process for ACHM. ■

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