

# Regulations proposed for animal–human chimaeras

UK lays out first framework to govern ethically sensitive research field.

BY ALISON ABBOTT

The increasingly sophisticated blending of different species to create chimaeras is pushing biology into a new ethical dimension. Last year, scientists used new stem-cell technologies to create a mouse with a functioning pancreas composed entirely of rat cells. So might it soon be possible to create a monkey with a brain composed entirely of human neurons? And would it think like a human?

Such an animal might be useful to researchers studying human cognition or human-specific pathogens. But it would be ethically unacceptable and should be banned, argues a government-commissioned report from the UK Academy of Medical Sciences, a body that promotes medical research.

The document, *Animals Containing Human Material*, says that genetic and stem-cell technologies are now so advanced that the creation of such animals is already on the horizon. But no country has yet devised a broad regulatory framework for the research. The report, released on 22 July, calls for the United Kingdom to take the lead in putting in place specific safeguards.

“We are not proposing a new tier of regulation that will hold up important research,” says Robin Lovell-Badge, a developmental biologist at the Medical Research Council’s National Institute for Medical Research in London, and a member of the working group that drew up the report. At the same time, he says, “we don’t want scientists to cause problems for the future by overstepping the mark of what is publicly acceptable”. Unlike the hypothetical monkey with a human brain, many animals containing human material (ACHMs) are likely to advance basic biology and medicine without transgressing ethical boundaries, the report concludes.

The working group, chaired by human geneticist Martin Bobrow of the University of Cambridge, included experts in philosophy, ethics, social sciences and law, as well as biomedicine, and consulted internationally. The group also commissioned surveys and focus groups that revealed broad acceptance of some mixing of species among lay people who understood the rationale — but also unease about work that could introduce human traits into animals’ brains, reproduction or appearance (see ‘Public support’). The report is likely to inform similar debates in other countries, such as the United

States — which has generated several studies on aspects of ACHM research in the past six years but has no legislation in prospect — and Germany, where bioethical sensitivities are acute.

One category of experiments should be off-limits for the time being, according to the report. This includes the creation of a non-human primate with enough human brain cells to make it capable of ‘human-like’ behaviour. The report says that such animals, which might be able to develop human capacities such as reasoning or self-awareness, would have a moral status close to our own or to that of the

example, enable researchers to introduce a small number of human neural stem cells into a monkey’s brain to assess whether they could replace neurons lost in diseases such as Parkinson’s.

The report urges the UK government to establish a national expert body to advise on ACHMs, and to review the contents of these two categories regularly. The government is likely to incorporate the proposals into legislation.

## INTERNATIONAL ATTENTION

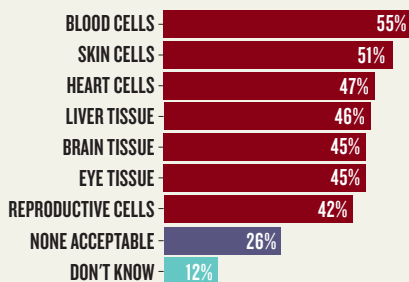
Most ACHM research needs no additional oversight, the report concludes. Innumerable transgenic mice expressing human genes have already been created to study a wide range of human diseases. Transgenic sheep and goats are routinely used to manufacture human proteins for treatment, and pigs containing human genes are being developed for transplantation surgery. In the United Kingdom and most other research-intensive countries, the report says, animal-welfare authorities already regulate this type of work adequately.

Other countries are likely to scrutinize the UK report closely, says molecular biologist Jens Reich, a vice-chairman of the independent German Ethics Council in Berlin, which is preparing its own advisory report on the subject. “ACHM research is very controversial in Germany, and very political because our constitution stresses that the ‘dignity of humans’ must be preserved at all cost,” he says. The UK report concludes that human dignity is not violated by ACHM research.

“It will certainly be looked to in the United States,” says Ruth Faden, a bioethicist at Johns Hopkins School of Public Health in Baltimore, Maryland, who has convened expert groups on the topic. She applauds the UK academy for funding an in-depth public-opinion exercise. “Our debates in the United States would benefit from this type of methodology,” she says. ■ **SEE EDITORIAL P.423 & COMMENT P.448**

## PUBLIC SUPPORT

In a poll of 1,046 Britons last year, about half supported experiments that put human cells or DNA into living animals. There was greatest concern about the use of brain, eye and reproductive cells.



great apes, which cannot be used for invasive research in most countries.

The creation and development of embryos formed by mixing embryonic or pluripotent cells from humans and non-human primates should also be banned for now, as should the breeding of animals that have human-derived sperm or egg cells and could generate a true animal–human hybrid.

A second category of ethically sensitive ACHM research could go ahead if approved by a specialist committee, the report says. This would include modifying the brains of animals, other than non-human primates, in ways that might give some ‘human-like’ function; generating or propagating human-derived sperm or egg cells in an animal in which there is no chance of fertilization; and creating an animal with some obvious human-like characteristic, such as human skin or speech. Some introduction of human genes or cells into non-human primates might also be allowed. That would, for

## CORRECTION

The News Feature ‘A spot of trouble’ (*Nature* **475**, 156–158; 2011) incorrectly states that US federal law requires newborn blood spots to be saved for two years. Only the results of the tests, not the samples, need to be kept on file for that period.