



Hype, hope and hybrids

Science, policy and media perspectives of the Human Fertilisation and Embryology Bill

Edited by Dr Geoff Watts FMedSci

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Preface

Professor Martin Bobrow CBE FRS FMedSci

The debate about animal-human hybrid embryos – 'admixed human embryos' – started because scientists who wanted to understand the potential of human stem cells for developing treatments for diseases caused by a loss of specialised cells (including forms of diabetes, blindness, muscular dystrophy, and dementia) found their work inhibited by a lack of appropriate stem cells on which to experiment. Producing stem cells originally required human eggs, which are in short supply. So a few researchers proposed using the outside (non-genetic) part of animal eggs to start the stem cell process. The idea, in essence, was to enclose human genetic material in an animal casing. And the objective was to produce cells for study in a laboratory dish; there was never any question of developing living animals with a recognisable body form.

I am a medical geneticist and no expert in fertility or embryology. I was asked to chair an Academy of Medical Sciences working party which set out the scientific background to the debate on animal-human hybrid embryos. As a geneticist I have spent decades trying publicly to explain the limitations of genetic tests and genetic explanations of disease. I believe passionately that all scientists have a duty to ensure that people whose taxes support their research understand what is being done and what may be expected of it. Virtually all scientists I have met have strong and clear ethical standards. But our task is not to impose these on society; rather it is to ensure that the views and standards of our society are informed by a proper understanding of the science and where it may lead, and to avoid it being driven by hype or fictitious scare stories.

The debate about hybrid embryos had both ethical and scientific dimensions. Scientifically, the question was not whether this would definitely work, but whether we could be sure it was even worth trying. By chance, while the debate was actually in progress, a new Japanese technique was published. This uses complex chemical manipulations rather than animal eggs to kick-start stem cell development, and at the moment this looks very promising. So the admixed human embryo approach may not even be much used. If that is how things work out, well and good, but it will still take years of detailed study to be sure that this other approach will be sufficient to develop, validate and test new treatments. Either way, the value of the lessons learned from the debate about hybrid embryos remain.

On the ethical arguments, my views as a scientist are worth neither more nor less than anyone else's. My colleagues and I could never tolerate an experiment that deliberately harms a child. So although I profoundly disagree with their view, I can therefore understand that those who sincerely believe that a microscopic human egg cell or small ball of cells shortly after fertilisation is the moral equivalent of a developed human being, find these experiments unacceptable. While I respect this different ethical stance, I cannot feel the same respect for distorting the facts to bolster the argument by, for example, trying to

make it appear that the experiments were designed to produce live creatures with mixed human and animal properties.

The varying contributions to this booklet tell of a group of people from different backgrounds who worked hard together to achieve a common purpose. The resulting legislation will, we believe, serve Britain and the world well, because it is based on a sound understanding of the promises, the limitations, and the potential dangers of these scientific advances. Of course it does not satisfy everyone, and is unlikely to be the last word in this debate.

For me, this episode does not represent a triumph of one point of view, or of one group of people. It is a story of success in ensuring that the facts were sufficiently clear and accessible, so that the decisions were properly based on underlying societal values and interests, and not distorted by ignorance, misunderstanding, or misrepresentation.

Professor Martin Bobrow CBE FRS FMedSci is Emeritus Professor of Medical Genetics at the University of Cambridge

Editor's introduction

Dr Geoff Watts FMedSci

Like many journalists working in science and medicine I have lost count of the number of times I've been invited to write a piece or give a talk on medicine/science and the media. The tension between these two enterprises is hardly surprising when you consider the difference between their central characteristics. Journalism relishes the personal, the particular and the subjective; it thrives on anecdote; it looks for simple, un-nuanced explanations, for judgements of right and wrong, safe or unsafe. Science, by contrast, emphasises objectivity and detachment; it paints the world in carefully modulated shades of grey, and more often talks of likelihoods and probabilities than of certainties.

Although these differences can make for mutual frustration, day to day they're surprisingly well accommodated. But not always. When the stakes are high or the issue exceptionally contentious the relationship can become a train crash waiting to happen. And sometimes it does happen. The wreckage of the long running disputes over GM crops and the MMR vaccine are two obvious examples in which neither science nor journalism have much to celebrate.

The saga of animal-hybrid embryo research turned out quite differently – although the phrase 'turned out' is misleading. This would seem to imply a degree of chance; that things just happened to go well. The reason that things went well was that nothing was left to chance. Scientists, press officers and other media advisers all foresaw the possibility of another debacle and took steps to prevent it. Their proactive efforts paid off. In spite of some lurid headlines, public and politicians were given an opportunity to hear – often from the scientists themselves – what would be done, what would not be done, and what the benefits might be. The Government, initially minded to put the brakes on hybrid embryo research, changed tack.

Conceptually there was nothing difficult about the measures that were taken to foster an informed debate. But achieving this did require foresight, planning and organisation. And on the occasions when events moved rapidly and the temperature began to rise, fleetness of foot was essential. For these reasons Fiona Fox – Director of the Science Media Centre and one of the people most involved in the whole exercise – suggested that some of the players should record their individual view of events as they unfolded.

This was certainly a campaign, though not in the obvious sense. What Fiona and her colleagues concentrated on was not so much the end – this was up to the scientists – but the means. It was a campaign to ensure that the arguments of the scientists, their voices, received a hearing. And in this they succeeded. An outline of the lessons to be learned from the experience, whether implicit or explicit, may be of value to future researchers working on different topics but facing a similar need to garner the understanding and support of the media and the public.

On account of the co-ordinating and facilitating role it played, the Science Media Centre receives a number of mentions in the contributions to this pamphlet. However, the Centre is at pains to stress that it could only be as good as the team of science press officers it worked with. The collaboration succeeded because the staff of organisations including the Academy of Medical Sciences, the Wellcome Trust, the Royal Society, the Medical Research Council, the Association of Medical Research Charities, and many individual patient charities put aside their brand names and pooled their considerable skills to amplify the key messages.

In editing the contributions I have allowed them to keep their differing flavour rather than seeking to impose a rigid house style. There is, inevitably, some repetition of basic facts as all are recalling the same events, albeit from different viewpoints. Some are more personal than others. But together they constitute a useful guide for anyone, whether a scientist or a press adviser, who needs the help of the media in trying to engage the public in an area of controversial science. It is possible to ensure that science gets a hearing.

Dr Geoff Watts FMedSci, is a freelance writer and broadcaster on science and medicine

Hybrid embryos and the Human Fertilisation and Embryology Act: a brief chronology of the debate

You could say, looking back to 1984, that it was Baroness Warnock who first, and entirely inadvertently, queered the pitch. The *Report of the committee of inquiry into human fertilisation and embryology* – the Warnock Report that paved the way for the 1990 Human Fertilisation and Embryology Act – declared that "the embryo of the human species ought to have a special status". Years later, in a Lords debate on stem cells (December 5, 2002), she mournfully backed away from this and similarly imprecise expressions. "I regret that in the original report that led up to the 1990 legislation we used words such as 'respect for the embryo'... I think that what we meant by the rather foolish expression 'respect' was that the early embryo should never be used frivolously for research purposes." No matter, the mood was set. As far as hybrid embryos were concerned, it was made explicit by Sir Liam Donaldson in his expert advisory group report of 2000, *Stem cell research: medical progress with responsibility*. Among its recommendations was that "mixing of human adult (somatic cells) with the live eggs of any animal species should not be permitted".

This view, however, was not universally endorsed. A 2002 report from the House of Lords Select Committee on stem cell research took issue with Sir Liam's group. Indeed, it suggested that the use of hybrid embryos might even be preferable to research on more conventional material. The Commons too rejected Sir Liam's view; in March 2005 its Science and Technology Select Committee report *Human reproductive technologies and the law* advocated new legislation to define the nature of inter-species embryos and to make their creation legal for research purposes, subject to the 14-day rule.

The Human Fertilisation and Embryology Authority made a similar case. Responding to the Department of Health's consultation on a review of the Act it stated: "The creation of human-animal hybrids is permitted until the two cell stage under the current Act... As long as it can be ensured that such entities [hybrid embryos] would never be implanted into a woman or allowed to develop beyond the 14 day stage, and as long as the research would fall under current research purposes, it could be argued that the ethical justification for the creation of such entities is consistent with research as it is currently allowed."

In August 2005 the Science Media Centre arranged a background briefing on chimeras at which scientists discussed the possibility of using human-animal hybrid embryos in research, while also raising concerns about regulatory loopholes. It was the first step in what became a concerted attempt to keep public and politicians, via the media, fully informed.

In November 2006 researchers from King's College, London and Newcastle University applied for permission to create stem cells, for research purposes, from hybrid embryos. The following month saw a white paper on embryos that stated "the Government will propose that the creation of hybrid and chimera embryos *in vitro* should not be allowed. However, the Government also proposes that the law will

contain a power enabling regulations to set out circumstances in which the creation of hybrid and chimera embryos *in vitro* may in future be allowed under licence, for research purposes only."

Treading this wobbly and circuitous path, and trying to direct it, were lobbyists both for and against hybrids. In January 2007 the HFEA decided to hold a full consultation to gauge public opinion. The Human Genetics Commission gave its support to hybrid embryo research in February 2007, as did the Commons Science and Technology Committee in March of that year. The Government published its draft Human Tissues and Embryos Bill in May, declaring that its intention was now to accept the Committee's recommendation to allow certain categories of inter-species embryo.

In September 2007 - following the publication of its consultation findings, and using powers it already possessed - the HFEA decided in principle to allow the creation of hybrid embryos. In January 2008 it issued licences for this purpose to researchers at Newcastle University and King's College. The Newcastle group announced the production of the first human-cow hybrid embryo in April 2008.

On May 19, 2008, in a free vote and rejecting an amendment to the contrary, MPs gave their backing to the creation of hybrid embryos.

Timeline of key events and publications

1990	Human Fertilisation and Embryology Act introduced.
August 2000	A report from the Chief Medical Officer's Expert Group, <i>Stem cell research: medical progress with responsibility</i> (The Donaldson report), reviews the potential of developments in stem cell research and cell nuclear replacement to benefit human health.
2001	The Human Reproductive Cloning Act is introduced.
2002	House of Lords Select Committee on Stem Cell Research publish their report <i>Stem cell research</i> .
2005	House of Commons Science and Technology Committee publishes <i>Human reproductive technologies and the law</i> and <i>Inquiry into human reproductive technologies and the law</i> .
August 2005	Science Media Centre background briefing on chimeras.
November 2005	Department of Health undertake public consultation and review of the Human Fertilisation and Embryology Act (1990).
December 2005	Revelation of fraudulent claims by South Korean researcher Hwang Woo-Suk to have produced a viable embryonic stem cell line from a cloned human embryo.
January 2006	Science Media Centre background briefing on Hwang affair. Speakers include Alison Murdoch, Newcastle University, one of the researchers aiming to work on hybrid embryos and Chris Shaw, King's College, London who reveals that he and Ian Wilmut, Roslin Institute, aim to use animal eggs to create human-animal hybrid embryos.
November 2006	First applications for permission to create hybrid embryos by teams at Newcastle University and King's College, London.
December 2006	Department of Health command paper <i>Review of the Human Fertilisation and Embryology Act: proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)</i> .

January 2007	Science Media Centre press briefing on threats to UK stem cell research. Speakers include Dr Lyle Armstrong, Newcastle University, Professor Stephen Minger, King's College London and Professor Anne McLaren, Cambridge University.
January 2007	Human Fertilisation and Embryology Authority (HFEA) announces public consultation <i>Hybrids and chimeras: a consultation on the ethical and social implications of creating human-animal embryos in research</i> – which subsequently runs from April to July.
March 2007	House of Commons Science and Technology Committee publishes a report <i>Government proposals for the regulation of hybrid and chimera embryos</i> .
May 2007	Department of Health publishes Human Tissues and Embryos (draft) Bill. The Bill allows for the creation of human-animal hybrid embryos.
May 2007	May 2007 Joint Parliamentary Scrutiny Committee appointed.
June 2007	Academy of Medical Sciences publishes its <i>Inter-species embryos</i> report
July 2007	Joint Human Fertilisation and Embryology Parliamentary Committee calls for a free vote on sections of the Bill relating to hybrids.
August 2007	Joint Parliamentary Scrutiny Committee publishes its report on the Human Tissue and Embryos (Draft) Bill.
September 2007	HFEA publishes <i>Hybrids and chimeras</i> a report of their consultation, which supports the creation of hybrid embryos.
October 2007	Government publishes its response to the Joint Parliamentary Scrutiny Committee report.
November 2007	Draft Human Fertilisation and Embryology Bill introduced into the House of Lords.
January 2008	HFEA grants licenses to Newcastle University and King's College, London to create hybrid embryos.
February 2008	House of Lords votes in favour of Human Fertilisation and Embryology Bill.
February 2008	Human Fertilisation and Embryology Bill introduced into the House of Commons.
March 2008	Easter weekend sees Cardinal Keith O'Brien, leader of the Roman Catholic Church in Scotland, publicly condemning the Bill's proposals regarding hybrid embryos.
April 2008	Announcement of first human-cow hybrid embryo by scientists at Newcastle University.
May 2008	MPs vote to allow the creation of hybrid embryos.
October 2008	MPs vote through Human Fertilisation and Embryology Bill.
November 2008	Human Fertilisation and Embryology Bill gains Royal Assent.

Going public: the clinician-scientist's view

As a clinician working in neurology, Professor Chris Shaw regularly sees patients with degenerative diseases for which he can offer no treatment; as a scientist he is trying to develop an effective therapy. Like researchers working in many branches of biology and medicine, he is certain that stem cells represent one of the most promising approaches to a range of currently incurable disorders. The problem is to get access to large numbers of such cells. Hybrid embryos offer one solution to the problem.

Here he sketches the scientific background to the events which prompted him and a handful of other scientists and doctors to seek rather than avoid media attention. He also reveals how his own misjudgement of media and public knowledge of biology caught him off guard.

In 2003, using just a few chemicals and some careful cell culture, Tom Jessell and his research group at New York's Columbia University managed to turn mouse embryonic stem (ES) cells into fully functional motor neurons, nerve cells. To have generated 'real' neurons in the laboratory was revolutionary. Around the same time I was trying to develop an experimental cellular model of motor neuron disease (MND) using brain cells that expressed one particular mutant gene. Perhaps we could apply the new methodology to human ES cells carrying the mutant genes that cause the human disease...

Also around that time Ian Wilmut – famous for having cloned Dolly the sheep – invited me to collaborate on a new project. The goal was to reprogramme an adult skin cell from an MND patient and turn it into an embryonic stem cell capable, in turn, of being turned into a motor neuron. Ian's proposal was to remove the nucleus from a human egg, and replace it with genetic material from an MND patient. The egg would then be stimulated electrically to behave as if it were newly fertilised and ready to start dividing to form an early embryo. At the 40 cell stage its inner mass of cells – by now containing what are called pluripotent stem cells – were to be removed. Pluripotent cells have the potential to make cells of any type found in the body, and their number can be expanded almost without limit. The plan was not to inject newly-made motor neuron cells back into patients (which anyway I believe to be a highly unlikely treatment option), but simply to provide a better model of MND for finding and testing new drugs. Our aim, you could say, was to create the disease in a dish.

I had been working in the MND clinic for more than a decade. During that time many drug trials had come and gone without any real breakthrough. My patients were dying, usually within two years of diagnosis.

Dolly had demonstrated that adult skin cells from an animal could be successfully reprogrammed. Now Ian Wilmut wanted to apply the technology to advance the treatment of human disease. In 2006 he, Richard Anderson, Paul De Souza and I were awarded a licence by the Human Fertilisation and Embryology Authority to work on human eggs that had failed to be fertilised during IVF. This would be done only with the woman's full consent, and no embryo would be kept alive after 14 days.

Before we'd even begun work, the South Korean scientist Hwang Woo-Suk reported having reprogrammed human adult skin cells to make embryos and ES cell lines. Ian and I went immediately to South Korea to learn about the work first hand. Hwang was a gracious host, and his staff and laboratories were impressive. Heavily funded by the government, he travelled everywhere in chauffeur-driven limousines with armed guards for fear that the North Koreans might kidnap him and force him to clone the Great Leader.

Hwang's team were keen to collaborate with us. But shortly after our second visit in 2006 it was revealed that the human data from Hwang's laboratory had been fabricated by one of his team. Although Hwang had not initiated the deception, he was slow to acknowledge it.

Even before this scandal erupted we had realised that to achieve the number of cell lines we'd require would take more donated eggs from IVF laboratories than we were ever likely to obtain. We decided instead to explore the option of using animal eggs, an unlimited resource. A group in Shanghai had earlier reported success in generating human ES cell lines from rabbit eggs, and unpublished work suggested that a similar success could be obtained with cow eggs.

After the Hwang scandal broke, Fiona Fox of the Science Media Centre suggested that Stephen Minger from King's College, London, Anne McLaren from Cambridge, Lyle Armstrong from Newcastle, and I should meet the press and respond to their questions about Hwang. We could also re-state the importance of stem cell research.

The press conference was proceeding well until I was asked what would happen now it seemed less likely that human eggs could readily be used to generate ES cell lines. Without realising the implications I mentioned the Chinese work on rabbit eggs, and added that we too were considering that option. Interest in the issue escalated. Until that time I had thought that using animal eggs was an obvious alternative, and a lot less controversial than encouraging fertile women to donate or sell their eggs to researchers. Because I felt entirely confident that human and animal cells could safely be mixed (as indeed they had been for decades in testing sperm) I didn't realise that for some people this would be a step too far.

The debate in the media took off with some force. Although it was tempting to return to the lab and ignore the furore, I did feel responsible for having raised the subject. Although not myself a stem cell scientist, I felt I should support the researchers who do undertake this work. Moreover, my MND patients were desperate for developments that might advance the understanding of their disease. So with their backing, and Fiona's encouragement, I became involved in the public debate and in lobbying Parliamentarians. Over the following year we not only managed to reverse the Government's proposal to ban hybrid embryo research, but boosted public awareness of the plight of people affected by neurodegenerative diseases.

Other reprogramming technologies, such as genetic manipulation, may yet spare us the need to make hybrid embryos for generating patient specific ES cell lines. But even if no such cell lines are made in the UK, the debate has revealed that a majority of the public – and, in the end, politicians – support humanitarian science. Greatly encouraging to those of us who always hoped they would.

Professor Chris Shaw is Professor of Neurology at King's College, London.

The value of speaking up: the print journalist's view

All specialist journalists – not least those on the science and medicine beat – are delighted when their topic rises up the news agenda (unless it rises too high, in which case there's always the risk of it being handed to someone more elevated in the pecking order – a political correspondent, for example). Mark Henderson relishes the opening years of the 21st century as a great time during which to have been reporting on reproductive medicine in Britain. In the space of little more than half a decade we had the birth of Dolly the sheep, the first stem cells derived from human embryos, and the first draft of the human genome. Each of these was as eye-catching to the public as it was scientifically important to professionals.

Each of the recent batch of scientific advances in reproductive biology and medicine has unleashed a new round of contentious ethical debate. Yet the field was largely governed by legislation framed back in 1990 when few of these developments seemed possible. So it was no surprise when, in 2005, the Government set up a review of the Human Fertilisation and Embryology Act. It had been a successful law, setting the stage through arms-length regulation for mass public acceptance of IVF. But notwithstanding the 2001 amendment that had allowed for stem cell research, it was out of date. Its reform was clearly going to be a massive story.

Any doubts were dispelled when the White Paper announcing the Government's plans was published in December 2006. The reform was going to be controversial, and not only because of the measures on parental rights for homosexuals that first captured the headlines. Buried at the back of the document was a proposal to ban an area of research that many scientists considered extremely promising, human-animal hybrids.

The White Paper, and the Bill that followed it, were mainly concerned with fertility treatment, an issue of much more immediate importance to most people, including most *Times* readers. So at first it seemed unlikely that the hybrids measure would come to dominate public debate or the media coverage of the legislation. Moreover, hybrids looked like a hard sell: this was tough science to explain, and there was a serious 'yuck factor' involved. The Department of Health must have anticipated protests from a few angry scientists; but it was not prepared for the headlines it actually got.

The hybrids issue has many of those intangibles that make a great story. First there was ethical controversy, always a good talking point. Then there were the scientists who wanted to pursue this work; they were passionate advocates who could talk eloquently and persuasively about its importance. Behind them stood patient organisations, equally outraged that the experiments were being blocked. They provided a valuable human angle. Finally the entire medical establishment was supportive – and there was no evidence that public opinion was opposed.

There was a feeling that ministers had made a serious mistake. They had advanced no good reason for the ban, other than the findings of a flawed public consultation dominated by self-selecting opponents of embryo research. This was not just a tale of special interests railing impotently against a government

decision they didn't like. It was a battle that might be seriously embarrassing for ministers, and one that the scientists could win.

The pro-science rhetoric of Tony Blair and Gordon Brown was all about making Britain a great place to do medical research. They were proud of their record of enabling the stem cell work that the Bush Administration was doing its best to strangle. The British Government had seemed to understand that a permissive, light-touch approach to regulation – one that starts from the premise that experiments should be permitted under licence unless there are compelling reasons otherwise – is the best way to encourage scientific discovery. The proposed ban on hybrids was entirely out of keeping with this view – so much so, you might have thought the Department of Health had fallen asleep at the wheel.

So it proved. As I began to speak to contacts in Government it became clear that a U-turn was imminent. My sources began to brief against the Department of Health, telling me it had 'failed to understand' the research, and that other ministers wanted it approved. The Science Minister and the Chief Scientific Adviser both went on record in support, and even the Prime Minister said he hoped a way could be found to allow it. The Department duly changed its tune; the Bill would permit hybrids after all.

Once the Government had capitulated, the story died down for a while. It resurfaced when the legislation reached Parliament. But the critical lobbying had already been done. By engaging with the press, the public and Parliamentarians over many months, and explaining both the science and the rationale behind hybrid experiments, scientists such as Stephen Minger and Robin Lovell-Badge had made this research seem, if not quite familiar, then at least neither foreign nor frightening.

Journalists felt they understood what this work was about. With a few exceptions (the *Daily Mail* ran some truly bizarre stories) they covered it sympathetically. The public, too, was broadly convinced. A *Times* poll I organised just before the Commons vote found that 50 per cent supported the experiments against only 30 per cent who were opposed. Only at one point, when several Catholic bishops used their Easter sermons to attack the Bill, did it feel as if the mood might turn. But scientists again showed they were learning how to fight their corner. Colin Blakemore seized the agenda by writing to the *Times* challenging the bishops to a debate; and medical research charities brought forward publication of an open letter urging MPs to back the legislation (after a little cajoling).

This was an important battle for scientists to win. As I wrote in a *Times* commentary on the day after the final vote: "It confirms the value placed on free scientific inquiry in Britain, where regulation rather than prohibition is deemed the proper approach to ethically contentious research. As cybrids are supported by all the country's leading scientific institutions, a ban would have suggested that consensus matters less to Parliament than the vocal concerns of a religious minority." But it matters for another reason, too. It shows that, by taking their case to the press and public, scientists can influence the course of national debates, and even lead them. There can be great value in speaking up.

Mark Henderson is Science Editor of the Times and author of '50 Genetics ideas you really need to know'.

Showing and telling: the broadcaster's view

From climate change to nuclear power, from GM crops to vaccination, we are ever more frequently confronted with the products of science and technology: their advantages as well as the drawbacks, their costs as well as their benefits. Making sensible decisions about them requires us to understand what it is we are deciding. The same goes for our politicians. It can be argued that no industrial society calling itself democratic can really claim to be so if neither its leaders, nor those they lead, have the knowledge to make reasoned decisions on these matters.

The mixing of living human and animal material is clearly a technology that raises ethical as well as scientific issues. For news broadcasters like Fergus Walsh, speaking to predominantly lay audiences, the first challenge was to explain simply what hybrid embryos are, and why the scientists have been so keen to create them.

November 2006; the start of the debate about hybrid embryos. It found me digging my hand into a plastic pot of cows' ovaries and holding them up to the camera. This, in television terms, is a 'show and tell'. You don't lecture the viewers; you offer them some memorable images backed by a clear script. Like others in the trade, I'm always on the lookout for ways of reporting that engage the audience.

Back to those cows' ovaries. I was at Dr Lyle Armstrong's lab in Newcastle. My task was to explain why he'd applied for permission to fuse human and cow material, and why this should matter to the audience. The entire story was two minutes and 44 seconds long. Barely 500 words, but a veritable epic by TV news standards.

The ovaries had come from a Newcastle slaughterhouse. By holding them up to the camera I was emphasising that scientists had a limitless supply of animal embryos with which to do research on stem cells. By contrast, human eggs donated during IVF treatment were in very short supply.

Which brings us to the yuck response. This seems to be many peoples' instinctive reaction when first told of the weird, hybrid embryo idea. Just what are these scientists up to? That said, when carefully explained, most people can recognise that the aim is to advance medicine. If patient-specific stem cell lines could be made, there is a real chance that treatments for a host of diseases could be just over the horizon.

Scientists like Dr Stephen Minger went further, suggesting that experimenting with hybrid embryos is more ethical than using donated human eggs because of the potential risks to women of induced ovulation.

Some people, of course, oppose all embryo experimentation. Animal-human hybrids created an ethical dilemma which went beyond conventional religious objections to experimenting on human embryos. To complicate matters further, the Government's position underwent change. Initially there was talk of a ban on hybrid embryos, reflecting 'public unease'. This was followed by an outcry from scientists and medical research charities – whose views, in the end, prevailed.

The support for this research from within science itself was overwhelming. The Medical Research Council, the Association of Medical Research Charities, the British Medical Association, the Wellcome Trust and the Academy of Medical Sciences all lent their support, as did at least three Nobel laureates. Against this, two pressure groups – Human Genetics Research and Comment on Reproductive Ethics – voiced consistent opposition. So did the Catholic Church and a number of other Christian groups. It was the duty of broadcasters, indeed all journalists, to reflect the level of support and opposition to proposed research.

In the end, the recommendations to Parliament were left to a Joint Committee on the Human Tissue and Embryos Bill – which, in its wisdom, asked four journalists to give evidence. For those of us accustomed to asking questions of MPs it was a strange and rather terrifying role reversal.

It came as a surprise to some when the Human Fertilisation and Embryology Authority approved two licences for the creation of hybrid embryos before Parliament had had a chance to legislate on the issue. This was in January 2008. Three months later the BBC broke the story that Newcastle scientists had created the first 'part-human, part-animal embryos'.

It was a big story on the day, second only to political upheaval in Zimbabwe. I was live outside the Centre for Life lab in Newcastle. My report began with the first pictures of hybrid embryos: compelling images. The script was intended to explain, in simple terms, how they were created and why:

"These are hybrid embryos under the microscope: part human, part animal, each smaller than a pinhead. They were created in this lab at Newcastle University. The team wants to use them to study diseases like Parkinson's, stroke and diabetes. These dishes contain several hybrid embryos which survived for three days. Scientists stress they would never implant these into a woman. They're purely for laboratory research. The only reason why they used cow eggs is because human ones are such a scarce and precious resource. So how did they do it? An unfertilised cow's egg was cut open by a laser. Virtually all the genetic material was sucked out. Then DNA derived from a human skin cell was injected into the egg. By using an electric shock the hybrid embryo started growing. It grew for three days to 32 cells. The embryo is 99.9 per cent human and 0.1 per cent cow. They hope to grow them for six days to extract the stem cells inside. These are the body's master cells able to turn into any type of tissue."

- BBC Six O'clock News: 1 April 2008

Hybrid embryos had been created. It was clear that MPs would no longer be debating some hypothetical issue. A month later they voted to allow this research to continue.

What role did the media play in all this? It's hard to know, but a complex scientific issue had been clearly explained, with the arguments on both sides repeatedly set out. The decision had been made, the work goes ahead. Now the public wait for the science to deliver.

Fergus Walsh is a BBC medical correspondent.

Prompt, prepared and proactive: the view from the Science Media Centre

Throughout the period of the events described in this booklet, it was the Science Media Centre's offices in London's Royal Institution that served as the focus of much of the planning and organisation that allowed scientists to state the case for hybrid embryos. It was the Centre's director, Fiona Fox, who suggested this booklet; she thought that an outline of the personal experiences and lessons learned would be worth recording.

In what follows she concentrates on one of the keys to eventual success: that it was different this time because scientists were prepared to be proactive in briefing the media on a scientific controversy at an early stage. They were willing to treat every development – including, in some cases, attacks on their integrity – as an opportunity rather than a threat.

In March 2009, at a retrospective conference on the Human Fertilisation and Embryology Bill, its arch-opponent Josephine Quintavalle, Director of the Committee on Reproductive Ethics, angrily enquired if I had been to the Vatican to nominate *Times* science editor Mark Henderson for sainthood. She accused the Science Media Centre (SMC) and the scientific community of dominating the media coverage of human-animal hybrid embryos to the exclusion of all other voices.

As someone who cares passionately about balanced and accurate debate in the media, I'm sure I should have taken the criticism more seriously. Instead I thanked Josephine for the compliment, and admitted to the whole conference that it made me proud. Why? Because for the past ten years the complaint has often been that scientists fail to get themselves a fair hearing in the media. Indeed the SMC was set up because the scientific community felt that on issues like GM crops, the MMR vaccine and animal research it needed to be heard.

So what happened to make this occasion different? Why were critics, who'd had it their own way for decades as scientists routinely fled the glare of the media spotlight, now bristling at those scientists' newfound willingness to engage? Why did several broadsheet newspapers, including the *Times* and the *Financial Times*, write editorials and comment pieces drawing attention to the positive manner in which the scientific community had engaged with the public and media?

Most timelines on the media interest in human-animal hybrid embryos start in December 2006 with the Government's proposed ban. But it's important to realise that, by the time this happened, almost every key health and science correspondent working for the national news media not only understood the science involved, but knew and respected the researchers working in the field.

This had begun in August 2005 with a modest SMC background briefing at which Robin Lovell-Badge, Stephen Minger and the late Anne McLaren told a group of science journalists about 'chimeras, hybrids and cybrids'. They described the interest that scientists around the world had begun to take in the

possibility of fusing animal and human material in their research on stem cells and therapeutic cloning. This briefing was hugely significant because it reflected a new philosophy developing in the scientific community. As embodied by the SMC, it was that scientists should brief the media on possible future developments, especially when these were likely to attract sensational headlines and create public concern. There was a significant break from a past in which scientists involved in contentious research tended to stay quiet for as long as possible before announcing their work.

In this case there was no new announcement or published paper to report. No journalist had requested a briefing, not least because at that stage few of them knew anything about chimeras. In fact the briefing itself, having the ingredients to generate a scare story, could have been seen as risky. But the scientists agreed to speak, and took the opportunity not only to explain the complex science involved, but also called on policy makers and the public to debate it. They also pointed to an apparent regulatory loophole in the area. Far from resisting public scrutiny and regulation – the accusation commonly made of scientists – this group was embracing it.

In January 2006, following the exposure of the South Korean cloning fraud, the SMC called every therapeutic cloning expert in Britain and pressed them to come to London to explain its implications for UK stem cell research. In a room packed full of national news journalists, the scientists who attended openly discussed the implications. Professor Chris Shaw, a clinician who was collaborating with Ian Wilmut on motor neuron disease, revealed that the two of them were approaching the HFEA for a licence to work on rabbit or cow eggs in an attempt to escape the chronic shortage of human eggs for research.

Chris Shaw's revelation gave the papers a great front page story, and some had a field day with headlines about 'Frankenbunnies'. But the announcement was wholly unplanned (ask Ian Wilmut who was not at the briefing, but arrived at his office to a deluge of press calls). It was a straightforward answer to a question from Mark Henderson about the shortage of human eggs for research.

In spite of some scary headlines, and some images of supersize rabbits and humans with cow heads, the science in the reports was pleasingly accurate. The British public had been introduced to this controversial issue by great scientists and responsible science journalism – a combination so often lacking in previous media furores.

And herein lies the key message. Between these two early press briefings and the final vote in Parliament, the scientists involved had talked to journalists hundreds of times and done scores of media interviews. Every development from Parliament, the HFEA or Catholic bishops was seized upon as an opportunity to repeat the scientific and human case for pursuing this research, and to correct misrepresentations. No interview – no matter what time of day or night, and no matter how difficult or unpleasant – was turned down by the scientists involved.

In 1999, during a similar national debate on GM crops, many of the best plant scientists in the country turned away from unsympathetic media that splashed their research on the front pages. As a result the British public said no to a new technology without ever hearing the case for it from the scientists. Now, ten years later, we can point to a debate on a controversial issue which – as Josephine Quintavalle remarked – was frequently dominated by the science.

The British news media will always be a slightly unnerving place for scientists. With journalists demanding answers to tough ethical questions, almost every interview can become a debate. But somewhere along the line this group of scientists decided that engaging with the media is part and parcel of their role. Their example has given the SMC and every science press officer a positive example to hold up to the scientific community.

Fiona Fox is Director of the Science Media Centre.

Council of engagement: the view from the MRC press office

As an agency through which the Government channels more than £500 million annually in support of basic and applied research in medicine, it would have been surprising if the Medical Research Council (MRC) had had no opinion on the importance of scientists' freedom to do work involving hybrid embryos. Indeed, its 4,000 plus staff members include a number of scientists who might themselves wish to use the technique. The MRC did, of course, take a view and its independence of Government in the choice of work to be funded allows it to make its opinions known. It was persuaded of the potential benefits of using hybrid embryos, saw no insurmountable ethical objections to such work, and pressed its view accordingly. But as Press Officer Laure Thomas explains, doing so took the organisation into new territory.

In response to suggestions by Government that research on admixed embryos might be banned, January 2007 saw a panel of scientists at the Science Media Centre (SMC) making the case to journalists for allowing such work to proceed. For the MRC, as for the other organisations and individuals involved, the briefing marked an important development in the co-ordination of attempts to influence public attitudes on an issue of scientific importance.

The MRC has a history of providing expert comment on legislative proposals. This takes place both behind the scenes and more publicly through statements and responses to consultations, and in interviews with the media. Although these efforts have sometimes been carried out in conjunction with like-minded partners, the review of the Human Fertilisation and Embryology Act marked a substantial shift in the co-ordination of such efforts. Press and policy teams from leading research funders, learned societies and medical charities formed a 'coalition of the willing' to respond to the demands of the media and Parliamentarians for information.

Immediately after the January press briefing, the MRC re-published its response to the Department of Health's *Review of the Human Fertilisation and Embryology Act*. This made it clear that, with appropriate safeguards, the MRC believed that hybrid embryo research should go ahead. When the Human Fertilisation and Embryology Authority revealed it would hold off on granting licences for admixed embryo work, Professor Colin Blakemore (the MRC's then CEO) emphasised our support for such research.

Leading MRC scientists, including Robin Lovell-Badge and Chris Higgins, were asked to provide their views on what this research could offer scientifically, and as a step towards new treatments. Although Parliament would have to set the limits, the MRC viewed this research as ethically on a par with other examples of embryonic stem cell research, and other instances of mixing human and animal material.

The volume of press enquiries made it essential to coordinate them via the SMC – though the MRC's out-of-hours number was also available to journalists. The 2008 Easter furore was one such occasion. Catholic leaders campaigned so vehemently against the new Human Fertilisation and Embryology Bill that the MRC put up its new chief executive Sir Leszek Borysiewicz. Himself a Catholic, he gave an interview to

the *Times* that went beyond the science, exploring how he reconciled his support for embryonic stem cell research with his faith. Labelled 'the most senior Roman Catholic scientist in Britain' he explained that his conscience told him it was right to support research on promising therapies for devastating diseases such as Parkinson's and Alzheimer's.

We argued that, within limits set by Parliament, a promising avenue of research should not be closed off before any other had been proved to represent a more effective way of achieving the goal of improving human health. Although we tried hard to convey the complex science behind the headlines, not all our efforts attracted accurate coverage.

In the end of course our combined efforts were successful. The Bill was passed, and Sir Leszek had this to say, "The HFE Bill strikes the right balance between accelerating opportunities for understanding and treating a wide range of diseases, and restating the appropriate boundaries that exist today. These boundaries reflect not only prevailing social views, but also the framework within which our scientists feel comfortable working."

Although the 1990 Act had not specifically addressed the possibility of admixed embryos, we felt all along that we were simply fighting to maintain the *status quo* as we saw it – in other words, what would have been allowed by Parliament in 1990 had the issue come up at that time. Frustratingly, it often felt as if we were seen to be asking for much more. But we got there in the end, securing the best legislative outcome and also, through the media, with a majority of the public on board.

Laure Thomas was formerly Chief Press Officer at the Medical Research Council.

Mobilising members: the view from the Parkinson's Disease Society press office

For reasons that owe more to history and tradition than to any calculated policy decision, about a third of the expenditure on medical and health research in British universities comes from the charitable sector. As contributors on this scale, the views of the medical research charities carry weight. And on the issue of hybrid embryos, many of them were keen to join the debate. One such was the Parkinson's Disease Society.

At the time when the argument about animal-human hybrids was most active, one of the Society's press team was Andrea Ttofa. Among the reasons for which she'd wanted to join the team in late 2005 was her personal experience of how devastating Parkinson's and other degenerative neurological conditions can be. She wanted to help promote the research that the Society and other bodies are funding. But she hadn't anticipated finding herself immersed in a controversial debate. Her aim throughout was to give a voice to the thousands of people with neurological conditions who were eager to ensure that a potentially vital research avenue was kept open.

I first encountered the hybrid embryo research debate in December 2006 when a science journalist from one of the nationals rang to find out what the Society thought about it – the Government having indicated an intention to ban such research on grounds of public revulsion. At that stage I knew next to nothing about this work. Moreover, this wasn't an enquiry of the usual kind; we were being asked to state our position on the ethics of a new branch of scientific discovery.

As a charity we represent thousands of people with Parkinson's, and their families. We had to ensure that it was their voices that would be heard. Over subsequent months, through newsletters, focus groups and our website, we worked hard to explain to our members what this research entails. Only when we knew they supported it could we confidently speak out in favour.

Our public stance was then straightforward. We wanted to ensure that the Government did not cut off a line of research that offered the 120,000 people in the UK with Parkinson's significant, albeit so far unexplored, hope for the future. We weren't saying that cytoplasmic hybrids were the definitive route to a cure; rather that they seemed to be a valuable means of finding out how stem cells could be changed into specialist cells such as nerve cells, so opening up a way of finding new treatments.

As a press officer, and as the daughter of someone in the advanced stages of a degenerative neurological condition, I was in no doubt that it was imperative to work with the media to help the public and the policy makers understand the impact of Parkinson's. They also needed to grasp the limitations of existing therapies, and the store that thousands set by advances in research.

To do this we depended a lot on our members. We encouraged people with Parkinson's to share their experiences with the media. Several did so, confidently revealing how it had affected their lives, and

explaining the need for new treatments. Their interviews were sensitively reported by science journalists, balancing the scathing verbal assaults from Catholic and other opponents of the Bill.

People with Parkinson's also joined scientists, MPs and other patient groups outside the House of Commons as the Human Fertilisation and Embryology (HFE) Bill received its second reading. This was the outcome of a series of meetings at the Science Media Centre attended by press and policy officers from universities, charities and funding agencies to coordinate the actions of scientists and patients. Taken together these voices couldn't be ignored.

For 18 months the HFE Bill was ever present. Each time a new event unfolded, science journalists came to us. One of the memorable moments for me was the Easter weekend when representatives of the Catholic Church voiced their distaste for cytoplasmic hybrids. Scientists gave interview after interview. Easter Monday saw an article in the *Independent*: 'Parkinson's – the breakthrough'. A study had been published showing that it might be possible to treat Parkinson's disease with cells derived from cloned embryos. Skin cells from the tails of mice had been cloned using mouse eggs with their nuclei removed. These were turned into embryonic stem cells and transferred back into the brains of the same mice. This exciting development showed for the first time that it might be possible to generate human embryonic stem cells with which to treat Parkinson's. Real hope at a critical time in the debate.

A front page article in the *Times* announced a joint letter from a number of charities urging MPs to vote for cytoplasmic hybrids. The public could be in no doubt where charities like ours stood. Finally, in May 2008, the House of Commons backed research using hybrid embryos. It had been a difficult 18 month journey, but we'd been heard. I shed tears of joy.

Sadly, my dad died a few months later. But I can only hope that scientists and patients have opened up an avenue of research that will, eventually, help to create answers for other people like him.

Andrea Ttofa was formerly Media and Communications Manager at the Parkinson's Disease Society.

Speaking for others: the view from the research charities

Stem cell research has potential applications in many disorders. Given the number of organisations that belong to the Association of Medical Research Charities (AMRC) and the broad range of conditions to which they're devoted, the AMRC is an obvious source of information and comment for journalists covering this field.

As one of the public spokespersons of the Association, Dr Sophie Petit-Zeman often has to argue her members' case in media discussions on controversial areas of science. She's done live broadcast interviews in bed with flu, from a boat off the Turkish coast, and even after stubbing her toe so hard while running to answer the phone that she had to deliver her views with a dishcloth wrapped around her bleeding foot. So it wasn't particularly extraordinary that Easter Sunday of 2008 should have found her hurrying from a noisy ski shop in Chamonix in search of somewhere quiet to take a journalist's phone call. On this occasion it was about Catholic bishops pitted against the researchers and medical charities who were arguing for hybrid embryo research.

The call was from BBC News 24. Cardinal O'Brien's Easter sermon had described legislation allowing animal eggs to be used as 'shells' for human DNA as a "monstrous attack on human rights, human dignity and human life" that would allow experiments of "Frankenstein proportion".

And there was I thinking that all it did was enable scientists to create cell bundles in lab dishes (should we ever have called them 'embryos'?) as a source of stem cells for research. Given the shortage of human eggs, we and the Genetic Interest Group (GIG) had written to MPs before the second reading of the Human Fertilisation and Embryology Bill urging them to support it. We hadn't planned to go public with the letter at that stage; now, clearly, we needed to step into this unholly row.

In the inadequate shelter of a local church, snow piling down my neck, I was interviewed to a background of bells chiming for evening mass. Putting the patient-benefit case from the safety of my church doorway was easy enough. But on stepping back into the minibus, apologising to the people I'd kept waiting, I did have a moment's concern about telling them why. These were people I'd never met and would spend a week with; and there was something extra disconcerting about discussing it with the heavily pregnant chalet owner.

I avoided doing so for a while. But my phone rang again during dinner. As with previous arguments about animal research, I soon found informal chats on hybrid embryo work revealing the accuracy of MORI and other surveys that show overwhelming support for these activities. Common sense prevails when people think what would be lost if such work were not allowed.

I don't suggest that those who aren't swayed by the arguments must lack common sense. I do see why people resist using animals in medical research, or feel abhorrence at the thought of a proto-child as a source of cells. But I think that the 'common sense' underpinning such revulsion is often born out of inaccurate information, and that much of the emotion in the embryo research debate could have been avoided if we'd simply been clearer about definitions. Maybe even used a word other than 'embryo.'

John Smeaton, Director of the Society for the Protection of Unborn Children (SPUC), has written: "Let's not support charities who refuse charity to the unborn" and "however concerned they are for members of the human family who qualify to benefit from their charitable aims, the AMRC's concern is refused to the smallest, most vulnerable members of the human family..."

Hang on John, I'd walk over burning coals to protect a child (or adult) from harm. But if using a little bit of a cell bundle without potential for independent existence or sentience and which will be discarded before its 14th day can help understand cancer, Alzheimer's disease or a host of other ills, I'd be irresponsible not to help it happen. I would, to paraphrase John, be failing vulnerable members of the human family in a big way.

The 'absolute sanctity of human life' is surely about people not cells. My Catholic partner – some of whose views I yet hope to understand – says this one is incomprehensible to him. Several other Catholics have whispered the same to me, presumably hoping God won't hear.

Some people, in their guts, clearly feel uncomfortable about all this. My feelings about it too are, in part, visceral. They're born out of the daily reality of my job: human suffering through illness, and what researchers think might alleviate it.

There's also a pragmatic issue to be considered by charities supporting controversial work: will it have an impact on fundraising? Smeaton urges withdrawal of support from AMRC charities. As their umbrella body, we encourage them to be open about what they do with their money, and recognise that they sometimes need help explaining it. Getting such a diverse bunch (our members range from the Wellcome Trust through to tiny patient-led charities) to sign up to a common position is never easy – which is why a briefing put out by SPUC questioning whether charities were solidly behind hybrids was baffling.

SPUC also questioned why many of our members don't fund such research. Among several answers are that it's not and never will be the right approach for some, and that for those with annual research budgets of a few thousand pounds it's simply impossible.

Maybe one day my brain will go 'ping' and I'll see the point that our opponents are making. But what matters for now is the potential of hybrid embryo research to make things better. It may fail – that's the risk with research – and we mustn't hype it. We must also acknowledge that it'll be a long haul. It's too late for my beloved dead mum, my stroke-ridden dad, and almost certainly for me if I get sick tomorrow. I suspect we fought this for our children's children. If hybrid research bears fruit, I hope whoever's then in charge will look back at the struggle that allowed it to happen, and fight for the right of all to benefit – whatever god they may hold dear.

Dr Sophie Petit-Zeman is Head of External Relations at the Association of Medical Research Charities.

Stem cells, the Catholic church, and me: the view from the sharp end

Scientists want hybrid stem cells for their research; doctors want to apply the findings of this research for the benefit of patients; to journalists it's simply a great story. But some people have a more direct, more immediate interest – including those who've been diagnosed with a disease for which stem cell research might one day contribute to a remedy.

Charles Sabine is such a person. Genetic testing has revealed that he's inherited a copy of the mutant gene responsible for Huntington's disease. The symptoms of this disorder usually begin to appear in middle age; they include jerky and involuntary muscular movements, changes in behaviour, and a progressive descent into dementia. The illness is fatal and there is, at present, no treatment for it.

Individuals in this predicament are, understandably, reluctant to see the foreclosure of any potentially helpful line of research. Among the people and organisations trying to do just this have been some elements of the Catholic Church. For Charles Sabine, their discussion of hybrid embryos has been no mere abstraction, no purely intellectual debate. It's about his life, and his death. And he is angry.

It began at Easter, 2008. That a religious organisation could arrange the kind of news management associated with a professional like Alistair Campbell made me sit up. The lives of non-Catholics in the UK were to experience the force of dogma via the Easter Sunday sermon.

Having spent a quarter of a century as a television journalist, subjected to the Machiavellian methods of spin doctors in most corners of the world, I had developed a mental radar instinctively sensitive to those sections of society under-represented by the fourth estate. With a casual interest I had been noting how, since the start of the stem cell debate at the beginning of the decade, the naysayers and doom-merchants had set the agenda. This, I realised, had left the scientists, the infantry of the advance, on the back foot and forced to react from a position of social outcast rather than moral centrality.

In recent years my interest in the matter has become less objective. In 2005 I took a test that showed I have the mutant gene for Huntington's disease. Sooner or later – most likely in the next few years – its effects will start to kick in. Having watched the terrible path to death that this disease has already caused my father, and is now inflicting on my brother, I know what to expect. I also know that there is no treatment or cure for Huntington's disease. For those of us who suffer it, and the many more who care for us, each day is a search for glimmers of light to provide hope in the darkness of surrounding despair.

One thing that helps to keep us going is the group of extraordinary people brought together by the disease. Not just the carers, but the clinicians, scientists and other researchers who work to overcome it. So, when I see individuals or organisations driven by religious dogma standing in the way of that natural instinct to help others, it makes my blood boil.

Enter, that Easter, Cardinal Keith O'Brien. Aside from the factual inaccuracies inflicted on Mary Shelley, never mind stem cell researchers, this senior churchman's references to the "monstrous plans of Frankenstein proportions" in the proposed HFE Bill could hardly have been phrased in more emotive words. They were directly targeted at the lowest common denominators of tabloid sensationalism.

No less calculated was the timing: Easter, when the attention of more of the general public is turned in the direction of the Church, and when there is a relative news vacuum to be filled. With all the slickness of efficient PR, the press was briefed in advance. The BBC ran the story on Good Friday, with a full transcript of the sermon on its website. The *Times* gave it similar coverage the day after.

By the Sunday Dr Stephen Minger – with admirable conviction and unparalleled knowledge – was putting the case for the Other Side. But the Catholics were not playing fair. Instead of confining their argument with Dr Minger to his field of expertise, the science of stem cell research, they were subjecting him to questions on the *morality* of it. If they want to bring up the 'dignity of Man' in this issue, I shouted at the TV screen, let them have that argument with *me*: someone who's seen a father's dignity eroded in a way that I can only hope, for their sake, they never have to witness. Don't put someone who is just trying to help sick people into that line of fire.

I contacted Stephen Minger who put me in touch with the Science Media Centre, an organisation which, he explained, was coordinating press requests to the scientific camp. I had never previously heard of the SMC, but I thanked my stars. At least, I thought, there is now the chance of a more level playing field, and an organisation which can act as a means by which I can reach the press.

Whether the Bill would have passed without the SMC remains something about which we can only guess. But my unscientific opinion is that it would not. Confronted with an organised response backed by a team who understood public relations and the needs of the media, the zealots who had been so ready to preach so loudly at Easter seemed, like incense at an altar, to fade away. A BBC studio appearance by me that was supposed also to have featured a representative of the Catholic Church became a solo event.

The switch of occupancy of the moral high ground was seamless, total and highly satisfying. Since then, by the way, I have been asked to talk on the subject at the European Parliament and the European Stem Cell Symposium, and have joined the Global Advisory Council on Stem Cell Research.

None of this would have happened without the Frankenstein sermon of Easter 2008. For this, Cardinal O'Brien, thank you. But I still wait for a Catholic bishop to agree to debate the issue with me in public.

Charles Sabine, who has worked as a TV journalist, carries the mutant gene that causes Huntington's disease.

Staying ahead of the game: the policy officer's perspective

Many national science academies have gone through a difficult and sometimes painful process of learning that decisions on controversial areas of research can no longer be taken behind closed doors and without reference to the views of the public or the politicians. As a relative newcomer – it was founded just ten years ago – the Academy of Medical Sciences was able to draw on the experience of its longer established peers, and move quite painlessly up this learning curve.

This is not to suggest that relationships between academies on the one hand, and public and government on the other, are now a simple matter of maintaining a steady hand on the wheel. In the nature of science – especially biomedical science – the territory being explored is forever changing, as are the tools by which it can be investigated. Helen Munn discovered that to stay ahead of the game, academies have to respond swiftly to the earliest hint that something new – such as the advent of hybrid embryos – is likely to move centre stage.

The phone calls and e-mails started arriving at the Academy offices on December 17, 2006, the day after the Government published its *Review of the Human Fertilisation and Embryology Act: proposals for revised legislation*. Academy Fellows and their colleagues were dismayed and angry at the Government's statement that the "creation of hybrid and chimera embryos *in vitro* should not be allowed".

A fresh round of disappointment came after the Christmas break when the HFEA announced its decision to defer consideration of two licence applications to create cytoplasmic hybrid embryos pending a large stakeholder and public consultation. The strength of the scientific community's response seemed to take Department of Health officials by surprise; they told us repeatedly that there was a lack of consensus among researchers on the need for this work. Puzzled, we started phoning our Fellows and their colleagues. This soon revealed one source of the problem: definitions. "Are we talking about cybrids, chimeras or hybrids?" "Do you mean a hybrid or a true hybrid?" "Does that relate to a primary or secondary chimera?"

We saw our opportunity. Our president, Professor Sir John Bell, asked Cambridge geneticist Professor Martin Bobrow to convene a working group. "Happy to do this," he replied, "been wondering how I could interfere in this argument." So, in February 2007, we established one of the most stellar working groups the Academy has ever put together. Its remit was to examine definitions of hybrid and chimera embryos, to identify key research opportunities in the field, and to assess how these should be balanced by safety and ethical concerns. The group met only twice and published its report, *Inter-species embryos*, in less than three months. Most important, colleagues from the Medical Research Council, the Wellcome Trust and the Royal Society were closely involved from the start, and the team working on the HFE Bill at the Department of Health was engaged every step of the way.

The report set out two categories of definition: 'human embryos incorporating animal material' (that is, entities that should be covered by the HFE Act); and 'non-human embryos and animals incorporating

human material' (entities that should come under the regulations governing research involving animals). With respect to the first category the working group concluded that "research involving the creation and use of human embryos incorporating animal material should be permitted under license by the HFEA". As with existing (wholly human) embryo research, it emphasised three conditions: the work should address an important research need; the embryos should not be re-implanted into a woman; and they should not be allowed to develop beyond 14 days.

The group's preference was for the term 'inter-species embryo', and this was used in the draft HFE Bill published in May 2007. Strictly speaking, the term covers both categories of definition, and several Parliamentarians felt that a description was still needed specifically to describe embryos at the human end of the spectrum. The result was another term: 'human admixed embryos'. This may not be the prettiest of phrases, but it was one we could all live with.

The need to put some limit on the 'humanness' of embryos that should be encompassed by the Bill ran like a thread throughout the Parliamentary debates of 2007. Problems arose whenever attempts were made to define entities according to the amount of human material present. If defined by relative human/animal DNA content, where should the line be drawn? Nearer 5 or 50 per cent of human DNA?

It was at this point I had my most memorable media call. An ITN journalist called me at 5pm on a Friday evening with the breaking news that 'Scientists had put a human gene into a mouse!' After my short précis of 30 years of molecular biology the journalist seemed calmer – but still suspicious. What the incident revealed is the gulf between the public grasp of science and what are now routine experiments in laboratories around the world.

Early in its existence the Academy working group felt that the transfer of human embryonic stem (ES) cells, or increasing amounts of human genetic material, into non-human embryos and animals could present the most difficult social, ethical and regulatory challenges. While the HFE Bill was concerned with one facet of inter-species embryo research, the working group felt strongly that more consideration should be given to the interface between the regulation of animal research, human embryo research and human ES cell lines. The *Inter-species embryos* report committed the Academy to further work on this issue, a pledge that was explicitly welcomed in the Parliamentary debates.

The UK has been uniquely successful in developing legislation on human embryo research; it allows science to flourish within a framework supported by a majority of the public. Now, we hope, the country can again take a global lead in developing policies on research involving non-human embryos and animals containing human material. The Academy looks forward to working with colleagues, Parliamentarians, patients and the media on this new project.

Dr Helen Munn was Director of Medical Science Policy at the Academy of Medical Sciences – of which she is now Executive Director.

Beyond soundbites: the research funder's view

Established in 1936 and now with an endowment of around £13 billion, the Wellcome Trust is a charity that funds research to improve human and animal health. As the UK's largest non-governmental source of funds for biomedical work, the past couple of decades have seen it putting money into many innovative developments, including the sequencing of the human genome. When the potential benefits of work on stem cells began to attract scientists' attention, it was naturally enough to the Wellcome Trust that some of them turned for support.

Research does not take place in a social or political vacuum, and even the biggest and wealthiest charities cannot proceed as if it did. Sir Mark Walport FMedSci, Director of the Wellcome Trust naturally began taking a close interest in the outcome of the Parliamentary debate surrounding the Human Fertilisation and Embryology Bill. More specifically he was keen to bring some balance to public discussion by countering the 'frankenbunny' descriptions of human admixed embryos which had begun to appear in some of the headlines.

The media played a pivotal role in achieving the informed public debate about the Human Fertilisation and Embryology Bill that we felt was so essential. We wanted to explain both the need for research, and the science underlying the proposals, including the creation of hybrid embryos. As other contributors to this booklet have commented, work with the media on the issue began many months prior to the publication of the actual Bill. This ensured that the press was ready to respond when controversy arose.

Our initial focus, in early 2008, had been on Parliamentary briefings. It was as the debate became more heated that we appreciated the need to broaden the scope of our activities: to raise public understanding of the research by working more closely with the media. We were particularly grateful to all the researchers who spent time explaining their work to journalists, and rehearsing the need for appropriate provisions in the Bill. As a result, the press showed that objective and informed views on difficult areas of science can be presented to the public.

Another feature of the debate was the diversity of opinion. It was important to engage constructively with sharply differing viewpoints. I was delighted that the Trust was able to host a discussion titled 'Science, ethics and faith: a conversation about the Human Fertilisation and Embryology Bill'. This meeting, which grew out of an offer made in the press over Easter 2008 by Colin Blakemore, brought religious leaders together with scientists, clinicians, ethicists, philosophers and patients. It provided them with a neutral forum in which to set out their differing views. The intention was to move beyond soundbites, and take the heat out of the debate. Again the media played a key role. Edward Stourton chaired the debate, which was later broadcast by Radio 4 and made available as a webcast.

In another step to inform the public, the Trust commissioned and sponsored a supplement on stem cell research in the *Times*. This appeared on the Saturday prior to the crucial Commons vote of Monday 19 May 2008. It presented a range of views on stem cell research including those of patients and ethicists as

well as researchers. It also illustrated the need for stem cell research to be considered as a whole, and for the argument not to focus on hybrid embryos to the exclusion of other lines of research.

As in any area of science that creates controversy, the public needs accurate and balanced information. And when explaining the potential benefits of a science like stem cell research – a science still in its infancy – it is important not to over-hype the benefits. The media played an important part in transmitting these messages, and we are pleased that the combined efforts of journalists, researchers, funders and others led to an informed debate around the Bill.

Sir Mark Walport FMedSci is Director of the Wellcome Trust.

Learning from history: the clinician's view

Whether working in academia or in industry, for publicly or for privately financed enterprises, an increasing proportion of scientists and doctors have shown themselves willing to speak about their work to the media and, through them, to the public. Some do it in the hope that greater awareness and interest will bring them more research money; others because their funding agencies insist on it. But the most encouraging development is that many now see it simply as part of the job of doing science. People have a right to know what researchers are doing on their behalf and, sometimes, at their expense. Professor Peter Braude FMedSci, being firmly of this last school of thought, found it perfectly reasonable to become involved in making the case publicly for research on hybrid embryos. But, as he recalls, this was not his first experience of the process.

The precedent for active co-operation between scientists, clinicians and politicians over stem cells and hybrids was created by Enoch Powell's 1985 Unborn Children (Protection) Bill. This emerged shortly after the Warnock committee had issued its 1984 report on human fertilisation and embryology. The prominent and hugely wily Powell, then an Ulster Unionist MP, was fortunate in having had his private member's Bill adopted for discussion by the House of Commons. It seemed entirely possible that the Bill would have sufficient time to pass through both Houses of Parliament and into law. It had a single purpose: to render experiments on a human embryo created by *in vitro* fertilisation unlawful.

The funding authorities seemed unaware that the passage of such legislation would not only be disastrous for reproductive and genetic research, but would also render illegal two of the project grants which they themselves had awarded for work on human embryos. One of these was to Martin Johnson and me in Cambridge. Once the then secretary of the Medical Research Council, Sir James Gowans, had been made aware of the problem, the MRC supported the creation of an action group to provide scientific information to MPs.

Under the name PAGIGS (Professional Advisory Group for Infertility and Genetic Services) we convened a group of sympathetic clinicians and scientists. I chaired the group; it included such familiar names as Anne McLaren, David Baird, David Whittingham, Martin Johnson, Virginia Bolton, Robert Winston and Tom Fleming. Then as now, members of both Houses of Parliament rallied to oppose the Bill. Scientists and academic lawyers worked with them to deal with this imminent threat.

Knowing just how familiar Enoch Powell was with Parliamentary procedures, and how fervent was the opposition (mainly from those who associated themselves with the anti-abortion lobby), we felt it would be essential to have the support of equally experienced MPs. We were fortunate to attract strong cross-party support. Members of PAGIGS met frequently with MPs to brief them. Most important, we ensured that there were members of the group available, day and night, to provide advice and scribble briefs for MPs arguing in committee and trying to change the proposed legislation.

The tactics worked. The Bill ran out of time due to filibustering from MPs opposed to Powell. However, the Government was now committed to framing its own legislation. This it did five years later in the Human Fertilisation and Embryology Act. The importance of involving scientists and clinicians in the discussion of legislative change having been established, it was clear that we had to get involved.

The previous campaign had taught us what needed to be done. The new one was much better organised and had the support of many more MPs and Peers, some of whom have since been active in the recent 2008 amendments. Many medical and scientific organisations such as the MRC, the BMA, the Royal Society, and the Royal College of Obstetricians and Gynaecologists also got more involved.

In the recent hybrid embryo campaign there were still a few of us with enough corporate memory of dealing with the 1990 Act to bring together a new group of influential and knowledgeable scientists. In addition we now had the Science Media Centre to coordinate press contacts. And although the subject was more difficult and scientifically more challenging, some of our supporters during the earlier legislation – clinicians, scientists and MPs – had themselves become members of the Lords and, with minimal briefing, could speak with authority. They set a high standard of debate: one sufficiently compelling to influence the construction of new legislation, and of which we can be proud.

Our success reinforces a message which, sadly, has yet to reach some other countries still struggling to create regulatory frameworks or legislation: that scientists have an essential part to play in shaping them. One thing is clear; to be effective in this role they must accept that speaking to the press and the public should be seen not as an egocentric indulgence to be avoided, but as part of the scientist's job.

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The sources and the struggles: UK national newspaper coverage of hybrid embryos

To complement the personal accounts published in this booklet, the Academy of Medical Sciences, Medical Research Council, Science Media Centre and Wellcome Trust commissioned the Risk, Science and the Media Research Group at the Cardiff University School of Journalism, Media and Cultural Studies, to examine the media coverage of the animal-human admixed embryos debate. What follows is a brief summary of some of their main findings.

The Cardiff report covers UK newspaper stories on the admixed embryos debate published between January 1, 2006 and 1 December 2008 – a period that began with the Science Media Centre press conference at which the suggestion of hybrid embryos as a possible solution to the shortage of human eggs for stem cell research was first raised with the press.

What the Cardiff researchers did

The researchers framed their analysis as a war of words between two broad interest groups: "a large and powerful coalition of scientists, funding bodies, charities and pro-hybrid politicians on the one hand; and on the other a less cohesive group of religious figures (principally Catholic), ethicists, campaigners, and anti-hybrid embryo politicians."

In looking at tabloid, mid-market and broadsheet national newspapers published during the study period the researchers found 427 relevant items. These included news stories, features, and comment pieces. Their report comprises: an account of trends in newspaper coverage during the study period; a review of which sources were most successful at gaining media coverage and setting the news agenda; an analysis of how different newspapers, and journalists with different specialisations, reported the story in different ways; and a list of the key arguments put forward.

The task was not as straightforward as it might appear. "The news media," they point out, "are not neutral conveyors of knowledge to a public eager to learn of the latest scientific advances, and newspapers do not act like hypodermic needles, injecting neutral information into the bloodstream of public opinion."

Prominence and authorship

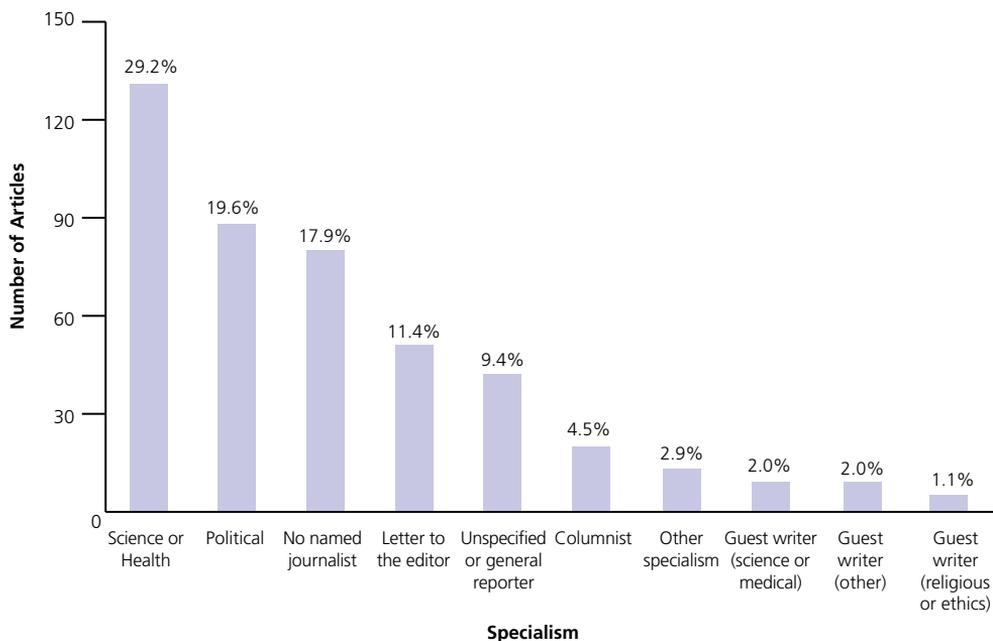
The authors measured the prominence of the coverage in various ways including the location of the pages on which stories were published, and the stories' length. The amount of 'front-end' coverage is a clear marker of prominence. Out of 255 hard news articles (as opposed to features, columns, and comment pieces, etc) almost one in ten appeared on the front page, and almost three in ten were published on other front-end pages. In all there were 23 front-page news stories about hybrid embryo research (9 per cent). On length, they say, "It is a marker of the detailed consideration which characterised much of the coverage of hybrid embryos that the largest proportion of the coverage it received was in articles of

more than 500 words (183, 43 per cent). Of the 427 pieces which discuss the practice of creating hybrid embryos for stem cell research a further 160 (37 per cent) were between 150 and 500 words in length. "

Of particular interest to all those who follow the practicalities of science reporting is what the Cardiff researchers have to say about authorship. A previous study from the same group has demonstrated that only a tenth of stories about science, health and technology are produced by specialist journalists, and that this proportion falls still further when topics become, for example, politicised or particularly controversial. "When, as was the case with hybrid embryos, they become the subject of high profile votes and political disagreement, stories which would normally be given to science or health specialists to cover, end up on the desks of political reporters or generalists who may have little or no previous knowledge of the science. "

Although this happened in the case of hybrid embryos, the value and importance of some correspondents' sources allowed them to continue working on stories that might otherwise have been lost to them. As the report points out, this was significant: "One consequence of the enduring ability of science journalists to hold on to this story is that those sources (such as the scientists and the SMC) who had cultivated strong links with science journalists from the start were able to maintain some influence over the media agenda even when the main focus had shifted somewhat from the science to the politics of hybrid embryos. "

Figure 1: Journalist specialism and by-lines in the hybrid embryo debate



When the Cardiff group rated newspapers according to the extent of the coverage, they found more in the broadsheets than the popular press (see Table 1).

Table 1: Coverage of the hybrid embryo debate in different newspapers

Newspaper	Number of Articles
Times papers	102 (23.9%)
Telegraph papers	80 (18.7%)
Mail papers	57 (13.3%)
Guardian or Observer	53 (12.4%)
Sun or News of the World	35 (8.2%)
Independent papers	34 (8%)
Mirror papers	26 (6.1%)
Financial Times	17 (4%)
Daily Star papers	2 (0.5%)

Sources

The report presents a detailed analysis of the frequency with which different sources were quoted. The researchers analysed 646 quotations, a majority of them (53 per cent) in favour of hybrid embryos. Anti-hybrid embryo sources made up 34 per cent of the total, and a further 13 per cent were classified as being neither for or against. "In sum, more than half of all quotations which appeared in print were broadly in favour, compared with a third which were broadly against."

This balance was not static. The proportion of sources quoted throughout 2006 and 2007 that were pro-hybrid was significantly higher than the proportion that were anti-hybrid. By 2008 the struggle between the competing sources had increased in intensity and the gap between them had narrowed, with 49 per cent of sources in favour and 40 per cent against overall. But, as the report adds, "even during the periods in our sample when the religious and political attacks on the science were most effective, the scientists and their allies were still cited by newspapers more often than their opponents."

The report also outlines the nature of the pro- and anti- sources. In the former category, scientists and funding bodies top the list (see Table 1); in the latter the top place goes to representatives of religion.

The press is by no means uniform. The emphasis varied between newspapers, with tabloids and mid-market papers citing a more equally distributed range of pro- and anti- sources than the broadsheets. Only two papers, the *Daily Mail* and the *Mail on Sunday*, cited more anti- than pro-hybrid sources.

Predictably, journalists with different types of specialisation tended to use a different balance of sources. "Science and health journalists in our sample quote far more scientists than other kinds of sources, and

political journalists cite more politicians than anyone else. A consequence of this is that specialist science and health reporters quoted more sources who favour hybrid embryos than any other group of journalists."

Table 2: Most frequently cited sources

Top pro-hybrid sources	Frequency of quotations	% of total quotations
Scientist/funding body	177	27.4%
Politician (government)	77	11.9%
Politician (other)	54	8.4%
Industry spokesperson (e.g. biotech, etc.)	8	1.2%
Religious representative	7	1.1%
Patient (or other affected person)	6	0.9%

Top anti-hybrid sources	Frequency of quotations	% of total quotations
Religious representative	93	14.4%
Politician (other)	55	8.5%
Anti-hybrid embryo activist	43	6.7%
Politician (government)	11	1.7%
Physician (medical doctors etc.)	9	1.4%
Scientist/funding body	3	0.5%

Key arguments

Most of the argument and the rhetoric about hybrid embryos can be categorised as being principally rooted in science or in ethics. The report reviews both.

In the former category, the most frequently used argument in favour of hybrid embryos relied on the presumed medical benefits of this research. Indeed, this was emphasised in almost three-quarters of all news items about the work. In addition to these medically based arguments there was a further set of scientific arguments. The most frequently quoted of these were that no embryo would be kept alive longer than 14 days, that human eggs were in short supply, that the embryos were predominantly human, and that no hybrid embryos would be placed in a human.

Opponents of hybrid embryo research also used arguments rooted in science. The two most popular were that the scientists' claims were exaggerated and unlikely to lead to medical benefits, and that other methods (especially the use of adult stem cells) were preferable.

Many stories made explicit reference to ethical arguments; these were deployed in greater number by the anti- than by the pro- lobby. This does not surprise the report's authors who comment that 'the most common reasons for opposing the research are rooted in deep and firmly-held ethical and moral concerns about creating life-forms...in order to experiment on them and destroy them, and equally serious concerns about 'tampering with human life' by mixing human and animal species.' Besides the simple assertion of moral wrongness, this set of arguments frequently refer to monsters, unnaturalness, ungodliness and the 'yuck factor'. But only a minority of references were what the authors call "overtly religious".

Explicitly ethical arguments made less of a showing in pro-hybrid statements and rhetoric. This may reflect an unspoken assumption that research devoted to the relief of human suffering is of its nature an ethically desirable enterprise.

Political arguments against hybrid embryos drew predominantly on assertions that the practice is controversial, and that public opinion is opposed to it. Political arguments in favour included claims that research of this kind is good for science, the economy, and the national interest – and assertions that public opinion is in favour if it!

Overall conclusions

The picture emerging from the Cardiff report is of a struggle in which those in favour of hybrid embryos came out on top. 20 per cent of news items were broadly against the science, 35 per cent were neither for nor against, but 45 per cent were in favour. A large proportion of the anti-hybrid items were letters to the editor, comment pieces and columns (see Table 3).

Table 3: Broad stance of different story types

	Broadly pro hybrid embryo	Broadly anti hybrid embryo	Neither pro - nor anti hybrid embryo	Totals
News article	122	36	119	277
Column or Comment	26	6	10	52
Editorial or Leader	12	3	7	22
Letter to editor	15	27	9	51
Feature	11	3	5	19
Profile	3	1	1	5
Other	1	0	0	1
Totals	190	86	151	427

Science journalists wrote the largest number of pro-hybrid articles, and were least likely to write broadly anti-hybrid articles or pieces with no clear stance. Political correspondents wrote more stories with no clear pro- or anti- stance. "The reasons for this are many and multi-layered. But an important one is likely

to be the strong relationships (based on mutual interest and trust) which developed between the science journalists and their pro-hybrid sources throughout this period. When hybrid embryos became a 'political story', there was no equivalent set of relationships between the scientists and the political reporters or generalists who also began writing about hybrid embryos."

Headlines, the Cardiff researchers note, were not always a clear indication of the message in the underlying story. A small group of stories published at the beginning of October 2006 carry headlines such as 'Moo-tant', 'Human Rabbit is Step Nearer', and 'Frankenbunny: Coming soon to a lab near you'. But, they add, "When you look at the body of these news pieces it soon becomes clear that in their content they are actually relatively balanced in terms of the sources and arguments invoked from both sides of the debate."

The authors' final conclusion is unequivocal. There is, they say, no doubt that the coverage of hybrids was pro-science overall, and favoured the messages disseminated by those in favour of research on hybrid embryos. "Taken together our data paint a picture of press coverage over a three-year period which was broadly in support of allowing the creation of hybrid embryos to be used in stem cell research both in terms of the sources quoted, and the reproduction of key messages, arguments, and rhetoric. In the struggle between the two broad groups of news sources active in the debate, those who supported hybrids won a clear, if contested, victory."

UK national newspaper coverage of hybrid embryos: source strategies and struggles by Dr Andy Williams, Slavko Gajevic, Professor Justin Lewis and Professor Jenny Kitzinger of the Risk, Science and the Media Research Group, Cardiff University School of Journalism, Media and Cultural Studies is available at www.acmedsci.ac.uk/publications



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