

REVIEW

A Critique of the Bateson Review of Research Using Non-Human Primates

Andrew Knight

Oxford Centre for Animal Ethics, UK

Abstract

Approximately 4,000 – 5,000 scientific procedures using non-human primates (NHPs) are commenced annually in Great Britain. The 2011 review by Bateson and colleagues was the first major systematic assessment of the ethics of this research. It concluded that 91% of 67 NHP studies conducted from 1997 – 2006 were ethically justifiable. However, the review systematically underestimated the costs to the NHPs. Additionally, it concluded that the medical impacts of a significant proportion of studies was low, and was sometimes exaggerated. Accordingly, the majority of these studies were incorrectly assessed as ethically justified. Many of the responses of the funding organisations to the review's recommendations were positive. Deeply concerning, however, was their failure to adequately acknowledge or respond to repeated criticisms concerning unsubstantiated claims and exaggerations of the medical value of NHP research. Clearly, poorly-substantiated claims about the medical utility of NHP studies by researchers or their funding organisations must be met with considerable caution.

Key words: Bateson Review, non-human primate, monkey, animal experiment, animal research, 3Rs.

Introduction

In 2010, 4,688 scientific procedures were initiated in Great Britain, that required the use of 2,649 monkeys. This represented around 10% more non-human primate (NHP) procedures than were commenced the previous year. Since 1995, some 4,000 – 5,000 procedures have commenced annually that require the use of NHPs (Home Office, 2011a-b). Although these comprise only a very small proportion of the total number of scientific procedures using animals (3.7 million in 2010), invasive NHP research is rendered particularly ethically problematic by the advanced psychological and social characteristics of the subjects. It is also particularly expensive. Accordingly, in 2006 a Working Group chaired by Emeritus Professor Sir David Weatherall examined the scientific and ethical case for the use of NHPs for research

into the prevention or treatment of human disease. It recommended that the major organisations funding NHP research undertake a systematic review of the outcomes arising from such research supported by them during the preceding decade.

Systematic reviews seek to provide the most reliable standard of evidence relating to scientific or clinical questions. They aim to identify, appraise, select and synthesise all relevant high-quality evidence. They typically search for relevant published studies using at least two biomedical bibliographic databases. Low quality studies should be discarded, and the remainder subjected to meta-analysis to derive conclusions.

Although already standard practice within human clinical research, systematic reviews remain markedly under-utilised within animal research, resulting in recent calls for their wider use (e.g., Hooijmans *et al.*, 2010). Their absence adds to multiple existing factors limiting the human clinical and toxicological utility of such research (Knight, 2011). At the time of writing, no such systematic review examining the medical or other societal utility of British NHP research had been published.

The Bateson Review of Research Using Non-Human Primates

Nevertheless, the *Review of Research Using Non-Human Primates* released in 2011 in response to the 2006 report by Weatherall and colleagues was the first major review that aimed to assess the human utility of such research in a systematic fashion. It was conducted by an expert working panel comprising eminent scientists in the fields of neurobiology, neurology, psychology, zoology, reproductive biology and translational research, and was chaired by behavioural biologist Professor Sir Patrick Bateson. Panelists were reportedly selected on the basis that they were expert in the scientific fields investigated by NHP research, but did not use NHPs themselves, or on the basis of their expertise in animal welfare or industrial-academic relationships. The panel was jointly commissioned by the major British funders of such NHP research, namely the Biotechnology and Biological Sciences Research Council (BBSRC), the Medical Research Council (MRC) and the Wellcome Trust.

The review commenced with a systematic search to identify all NHP research funded by these organisations from the beginning of 1997 to the end of 2006. Each organisation searched its grants database for NHP research, which was identified through factors such as mention of NHPs in the title or abstract, or funding requests for the purchase of NHPs. To supplement the data initially obtained, all identified grant-holders were requested to complete a questionnaire about the nature of each research project, and its outcomes and impacts. Seventy

two questionnaires were sent out. Five respondents could not be contacted, and three more declined to respond or participate.

Results of the review

In total 67 questionnaires were considered, which included 64 completed by grant-holders, as well as two for which the grant-holder could not be contacted and one for which the grant-holder did not respond. In these three cases questionnaires were completed by the funding agencies.

The largest proportion of the research portfolio related to neuroscience. Thirty one grants (46.3%) involved neurobiological research. Fourteen (20.9%) involved research into vision. Seven (10.4%) were related to work in immunology and infectious diseases. Another seven related to reproductive biology. Five (7.5%) related to studies of NHP behaviour. Two studies (3.0%) in the field of evolutionary biology used hair from museum and zoo collections to investigate the genetics of coat colour. The field investigated by the remaining study was not specified in the review.

In almost equal numbers, common marmosets (*Callithrix jacchus*) and macaques (*Macaca mulatta* and *M. fascicularis*) were the species predominantly used in the 67 research projects assessed. The numbers of NHPs used ranged from two to 240, almost all of whom were bred in the UK.

Almost all projects funded were conducted by unspecified UK researchers and institutions. A very small number of foreign researchers were also funded to work on projects in the US, Germany, the Netherlands, India and China.

Ethical assessment

The UK *Animals (Scientific Procedures) Act (1986)* regulates the use of animals for experimental or other scientific purposes. As noted by the report, the Act states that: *'In determining whether and on what terms to grant a project licence the Secretary of State shall weigh the likely adverse effects on the animals concerned against the benefit likely to accrue...'*

Both within the UK and internationally, the fundamental principle underpinning animal experimentation regulation and policy, and guiding the assessment of proposed research protocols by ethics committees, is that the likely benefits of such research must outweigh its expected costs. This position derives from a *utilitarian* philosophical position, in which the morality of a choice or action is determined by the resultant change in utility (such as lifespan, medical benefit, pleasure or useful knowledge) for all sentient beings affected.

Directive 2010/63/EU on the protection of animals used for scientific purposes must be transposed into new national legislation within all EU member states by the beginning of 2013. It exemplifies the increasing regulatory weight applied to such reasoning, asserting that it is, *'essential, both on moral and scientific grounds, to ensure that each use of an animal is carefully evaluated as to the scientific or educational validity, usefulness and relevance of the expected result of that use. The likely harm to the animal should be balanced against the expected benefits of the project'* (EU, 2010).

However, the panel noted that such a 'cost:benefit analysis' is not a fully quantifiable or exact science, but rather a matter of judgement. In exercising that judgement, the approach taken by the review panel was reportedly based on the following premise, which is Recommendation 1 of the Weatherall report: *"There is a strong scientific case for the carefully regulated use of NHPs where there are no other means to address clearly defined questions of particular biological or medical importance."*

The panel sought to retrospectively assess the quality of the NHP research, and its value to the advancement of scientific understanding. Bibliometric indicators such as output volume and citation impact were assessed to provide a quantitative assessment of research quality and impact. The panel also assessed the actual and, more commonly, potential human medical or other societal benefits arising from the research. Finally, it retrospectively assessed the health and

welfare costs imposed on the NHPs used. It also considered whether alternative animal or non-animal research models or tools might have been used in each project, and whether the statistical design of the experiment had successfully resulted in the minimum number of subjects necessary for statistical reliability of the outcomes.

The panel concluded that in most cases the use of NHPs was justifiable, but were concerned about approximately 9% of research programmes from which no clear scientific, medical or social benefit had emerged. However, for several important reasons the proportion of cases that were ethically justifiable within the utilitarian cost:benefit framework expected by society and required by applicable regulations was actually far lower than 91%.

Assessment of animal impacts

The review panel assessed the welfare costs to the individual animals used, assigning a classification of low, medium or high, in each case. In making their assessments, reviewers aimed to consider any available quantitative data indicating the animals' preferences, physical damage, physiological states that would indicate suffering in humans, and the extent to which the animals were stimulated to chronically operate homeostatic response mechanisms that would normally operate acutely. Additionally, they aimed to consider the ecological conditions to which the primates were adapted, their normal social structures, and the means by which they maximise their reproductive success.

Welfare was also assessed with reference to the *Five Freedoms*. These were first described in the Brambell report of 1965 as the Freedom from hunger and thirst, Freedom from discomfort, Freedom from pain, injury or disease, Freedom to express normal behaviour, and Freedom from fear and distress. They are considered to provide ideal states against which the welfare of farmed animals in particular may be assessed, but may also be applied to other animal use settings.

Despite such considerations, it is clear that the review panel systematically underestimated the

costs to the animals of the research it assessed. Of the 31 neuroscience studies examined, for example, half were assessed as having imposed a high welfare cost on the animals used. Disturbing though this is, unfortunately, when using a more reasonable basis for assessment, it can be seen that this may well have been an underestimate. Studies involving the surgical creation of experimental *lesions* (that is, areas of tissue damage) were not assessed as having a high welfare cost, unless '*significant and lasting impairments to the monkeys' welfare*' resulted.

Although the Bateson report did not define '*lasting*', it is reasonable to assume that this refers to a period — possibly permanent — beyond the normal post-operative timeframe required for all surgical healing. Yet, the normal post-operative timeframe may still be very significant. Simple skin healing sufficient for suture removal commonly takes 10-14 days, for example, in the absence of complications. Maximal strength is not gained for several additional weeks. Even 10-14 days is a substantial timeframe for a primate to endure any significant functional impairment. Unlike most human surgical patients, such primates cannot understand the cause of their post-operative pain and impairments. They have not consented to their surgeries, and they do not understand that they may recover from them in time. Such factors can only be expected to compound the distress they experience — substantially.

Yet, by applying the report's definition, surgery causing significant damage and functional impairment that was not prolonged would very probably have received a medium impact rating, even though such procedures may still severely impact welfare during the post-operative period. Any such procedures should have been more accurately described as imposing high welfare costs, and differentiated from procedures causing more prolonged damage by the creation of additional categories, such as 'high and prolonged', and 'permanently high'.

Even more disturbingly, invasive studies conducted under terminal anaesthesia received a

low impact rating, and those resulting in euthanasia following experimental infection with diseases resulted in low to medium ratings, depending on how far the diseases were allowed to progress. This may have been technically correct from a strict welfare perspective, if relatively low levels of suffering resulted. However, such assessment makes no allowance for the serious moral issues raised by killing. Animals used in laboratories are not simply expendable. Their lives have intrinsic value, and the loss of those lives is morally significant. The killing of these primates should not have been so lightly dismissed simply because their deaths occurred under anaesthesia. An appropriate allowance for the intrinsic value of their lives should have been included in the moral calculus.

Importance of experimental outcomes

The panel assessed experiments as potentially justifiable if they had delivered, or were believed to have the potential to deliver, a wide range of societal benefits. These were described as including benefits to science, human and veterinary medicine, animal welfare, or any other identifiable public good. This included benefits as diverse as increasing public understanding of science, the training of researchers, and the development of public policies. However, it was quite clear that the strongest justifications for most experiments were considered to be their scientific contributions.

Unlike assessments of the contributions to scientific understanding, and of the health and welfare costs imposed on the NHPs — both of which were conducted retrospectively, assessment of possible medical benefit was usually prospective, because of the time commonly elapsing between publication of research articles and any translation to medical applications. No evidence of the latter was apparent in most cases.

In short, the panel assessed 91% of these NHP studies as ethically justifiable. In the great majority of cases, this was based primarily on their perceived scientific contributions, and future medical contributions which were

markedly speculative. These assessments resulted despite substantial — and in many cases severe — costs to the NHP experimental subjects.

However, all experiments are normally considered to have advanced scientific understanding if they provide new knowledge (regardless of its utility), are of reasonable quality, and subsequently achieve publication in peer-reviewed scientific journals. The relatively high citation rates of many of the publications resulting from this research was a key point used to argue for their scientific importance. Yet, citations do not necessarily indicate scientific importance in and of themselves. The nature of the citing paper is also important. This point was demonstrated by a detailed study of 95 randomly selected invasive chimpanzee studies (Knight, 2007). Fourteen of these had been cited by 27 human clinical publications. However, fully 63.0% (17/27) of those citing papers were wide-ranging reviews of 26-300 (median 104) references, to which the cited chimpanzee study made only a small contribution.

Nevertheless, NHPs studies that have been reasonably well conducted, successfully published and subsequently cited, may still be considered to have advanced scientific understanding, even if their contributions are small. All such studies may therefore be assessed as ethically justifiable, if they are cost free. But of course invasive NHPs studies are far from cost free. The very substantial costs incurred include costs to the animal subjects, and the consumption of considerable financial and scientific resources. It may even be argued that human patients and consumers may be adversely affected if their responses differ from those predicted by NHP studies, or if patients with serious conditions are denied effective clinical interventions, partly because potentially more efficacious research fields are under-resourced, given inevitable competition for scarce research resources consumed by NHP studies.

Therefore, any honest assessment of the costs and benefits of this research, which considers

the interests of both humans and NHP subjects without substantial bias, must conclude that experiments that simply contribute to the advancement of scientific understanding, without providing any tangible medical benefit — which comprised the great majority of the 91% condoned by the review panel — are not ethically justifiable.

With respect to the 31 neurobiological studies that received a high animal welfare impact rating, for example, the panel stated that, *'In most cases... little direct evidence was available of actual medical benefit in the form of changes in clinical practice or new treatments.'*

Of the 14 vision studies, four were assessed as causing a high welfare impact. Most of the remainder were assessed as resulting in a low welfare impact. However, this was often because the work had been carried out under terminal anaesthesia. As with terminal procedures generally, the panel did not acknowledge the very substantial costs to these animal subjects. It also concluded that, *'the actual and potential medical impacts of most of these studies were low.'*

However, as the panel later noted with respect to the NHP studies overall, *'This contrasts with the emphatic public statements about the medical benefits of NHP research made by some of the funding bodies and by grant applicants in, for example, lay abstracts'*.

In recommendation 12 the panel stated that: *'In their public engagement, the funders and researchers should avoid overstating and generalising the medical benefit of NHP research, since this cannot be substantiated in many cases.'* And elsewhere: *'It is important that the justifications offered for research projects are soundly based and demonstrable. Health benefits should only be claimed when their potential is real.'*

Withholding of information

Out of 72 questionnaires, three researchers did not respond or declined to participate. Five more could not be contacted. Hence, direct input from

fully 11% of researchers was not included in this survey. Nearly half of those researchers had retired from research, or left the UK. Yet, implicit within their grant and ethics committee applications should be a very clear understanding of the serious moral issues raised by invasive primate research, and of the need — both moral and regulatory — to ensure the benefits derived from such research were clearly likely to exceed the costs to the animal subjects. Furthermore, all would have been aware of the need to ensure that such a positive moral calculus was independently verifiable, both for the sake of their personal and professional reputations, and also, for the reputation of the wider NHP research field.

It is therefore disturbing that a small number of researchers chose not to provide information about the animal welfare impacts and scientific benefits arising from their work. As the review panel noted, *'It is reasonable to expect the recipients of public or charitable funding to be held accountable on issues of public interest and therefore this attitude was regarded as unacceptable'*.

Additional limitations

The review concluded that the great majority of these NHP experiments was ethically justifiable. However, although *'the aim was to undertake as thorough and as comprehensive a review as the data would allow'*, several factors unavoidably limit the reliability of the review's conclusions. Both the overall number of NHP studies and the study sample sizes were relatively small, and the research questions investigated and methodologies varied considerably. The quality of reporting within such studies was also variable. All of these factors markedly limit the potential for meta-analysis. The review cannot be considered a systematic review in the formal sense previously described, and at the time of writing, its results had not been published in a peer-reviewed scientific journal.

Conflict with published studies

Additionally, the conclusions of this review conflict markedly with those of a significant number of studies examining the utility of

invasive chimpanzee research, which have been successfully published in peer-reviewed journals. Attention has focused on chimpanzees partly because they are the species most closely related to humans, and consequently most likely to be generally predictive of human outcomes in biomedical research.

However, a sizeable 2005 survey concluded that the majority of invasive chimpanzee studies generate data of questionable value, which make little obvious contribution to the advancement of biomedical knowledge. Additionally, such studies rarely, if ever, demonstrate an essential contribution, or in most cases a significant contribution of any kind, to the development of well-developed diagnostic, therapeutic or prophylactic methods for combating human diseases (Knight, 2007). These results have since been confirmed by studies examining the use of chimpanzees during AIDS vaccine research and testing (Bailey, 2008), the fight against human cancers (Bailey, 2009), their use in hepatitis C virus research (Bettauer, 2010 and Bailey, 2010), and monoclonal antibody research and drug development (Bettauer, 2011). Unsurprisingly, the authors of these reviews did not conclude that such use of chimpanzees was ethically justifiable, but rather, quite the opposite. Bailey (2010), for example, concluded that, *'claims of the necessity of chimpanzees in historical and future hepatitis C research are exaggerated and unjustifiable, respectively'*.

Recommendations and organisational responses

The 2006 Weatherall report, the subsequent 2011 Bateson review, and the responses of the three funding bodies (BBRSC, MRC and Wellcome Trust, 2011), can all be found online at the locations provided in the References.

Many of the 15 recommendations provided by the Bateson review panel were clearly commendable. Recommendation 1 stated that, *'...each application for funds to support research using NHPs should be subject to rigorous review of the scientific value of the research, the probability of medical or other benefit, the availability of alternative*

approaches, and the likelihood and extent of animal suffering. In particular, care should be taken to ensure that the review is a dynamic process that keeps pace with and employs best current knowledge concerning animal welfare, scientific advances and changes in public perceptions.'

Recommendation 8 further stated that, *'Highly invasive and long-term NHP research often carries a high welfare cost. In such cases, funders should take particular care only to fund projects with a very high likelihood of producing scientific, medical or social benefit. Wherever possible, funders should take steps towards encouraging a preferential or complementary use of less invasive techniques...'*

The funders responded that, *'As funders, we will encourage our researchers, through our guidance to applicants and via review by the NC3Rs, to further develop the use of less invasive techniques such as neuroimaging and transcranial magnetic stimulation, where this is appropriate.'* The National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs, 2011) describes itself as, *'... an independent scientific organisation, tasked by Government with supporting the UK science base through the application of the 3Rs. We are also the UK's largest funder of 3Rs research.'*

Recommendations 2, 5 & 9 encouraged thorough consideration and implementation of alternative research methodologies and best practice research, housing and husbandry standards.

Recommendation 3 encouraged data sharing to ensure the maximum benefit is derived from NHP research. The funding organisations responded citing considerable steps already taken to facilitate this, including a requirement that, *'...researchers must make all publications available through open access repositories...'*, as well as their intention to, *'...investigate the feasibility of creating or supporting on-line repositories for digitised data to facilitate sharing of data between researchers.'*

The review noted the disproportionate failure to publish negative results, which is a wider problem afflicting animal research generally. Recommendation 6 asserted that researchers have a moral obligation to publish results — even when negative — partly to prevent work being unnecessarily duplicated.

As previously noted, Recommendation 12 stated that, *'In their public engagement, the funders and researchers should avoid overstating and generalising the medical benefit of NHP research, since this cannot be substantiated in many cases.'* Unfortunately, the response to this point did not appear to acknowledge the seriousness of this problem, or that many such claims are made prospectively to support grant and ethics committee applications: *'Applicants are advised to bear in mind the broad range of impacts that their research may have, spanning the advancement of scientific knowledge, health and wellbeing, economic competitiveness, policy development and the provision of skilled people to the workforce. Once the research is completed and published the likely impacts should be clearer and, as funders, we will aim to ensure that conclusions about impact are based on firm evidence.'*

Similarly, Recommendation 13 stated that, *'...where grants were awarded on the promise of human health benefits, the grant-holders should provide evidence of interest in and use by the medical and biopharmaceutical sectors.'* The response primarily referred to progress being made in the development of output monitoring.

The need for such output monitoring was made explicit in Recommendation 4, which proposed the development of output scanning mechanisms, *'...to identify research results with potential to deliver improvements to healthcare or other significant benefits to society, and to assess the extent to which the potential benefits are achieved. The stakeholder bodies should develop mechanisms to facilitate exploitation of new knowledge derived from NHP studies for clinical or other benefits to society.'* In response the funding organisations noted the development of research output tracking systems such as

‘e-Val’ by the MRC, and others by the BBRSC and Wellcome Trust, to collect information about experimental results, 3Rs advances and resultant publications.

Recommendation 15 proposed that further reviews of the outcomes, benefits and impact of NHP research should be carried out periodically. An interval of 10-15 years was suggested elsewhere in the report. The funding organisations agreed that every 15 years would be an appropriate interval.

In short, the responses of the funding organisations to the recommendations that researchers ‘...should avoid overstating and generalising the medical benefit of NHP research...’, particularly within their grant applications, were poor. However, the organisations agreed with the recommendations in general, and cited specific steps taken to ensure compliance in a number of important cases. They noted that:

‘...since 2004, we have strengthened our procedures for assessing all grant applications requesting use of NHPs, cats, dogs and equines. These applications are now reviewed by the independent National Centre for the Refinement, Reduction and Replacement of Animals in Research (NC3Rs). Any concerns are explored with the applicants and funding is not awarded unless these are properly addressed. We will continue to work with the NC3Rs to ensure that all research we fund using NHPs is assessed appropriately and the research undertaken is of the highest standard in terms of science and animal welfare.’

Conclusions

The ethics of invasive NHP research may be considered from different philosophical perspectives. However, the framework near-universally accepted within the scientific world, and required by applicable legislation such as the UK *Animals (Scientific Procedures) Act (1986)*, is that provided by a utilitarian perspective. The probable costs — primarily to the NHP experimental subjects — must be weighed against the likely human and other

societal benefits of such research.

The Bateson review was the first major systematic assessment of the ethics of invasive NHP research conducted within the UK. It attempted exactly such a utilitarian cost:benefit analysis. After reviewing 67 invasive NHP experiments conducted from 1997 – 2006, the review panel concluded that 91% of these experiments were ethically justifiable.

Unfortunately, however, the panel systematically underestimated the costs to the animals used. For example, using the panel’s definition, surgical procedures causing significant functional impairment would probably not have resulted in a high animal welfare impact rating, unless the impairment was prolonged beyond the normal post-operative healing period. Yet the latter timeframe may still be very significant for a primate that does not understand the cause of its post-operative pain and impairment, and does not understand that it will eventually recover.

Additionally, low impact ratings were often applied to invasive studies conducted under terminal anaesthesia, or to those resulting in euthanasia following experimental infection with diseases. The intrinsic value of these animals’ lives was entirely excluded from this moral calculus. Whilst technically correct from a strict welfare perspective, such assessment grossly underestimates the costs to the animals killed.

Finally, the great majority of these experiments were justified on the basis of their perceived scientific contributions, or future medical contributions. However, the panel also concluded that the actual and potential medical impacts of a significant proportion of these studies was low, and that in many cases there was little evidence of resultant medical benefit, despite ‘*emphatic public statements about the medical benefits of NHP research made by some of the funding bodies and by grant applicants*’.

In light of the very substantial costs incurred by the NHP subjects of these experiments, as well

as their considerable consumption of financial and scientific resources, a more reasonable position is that experiments that simply contribute to the advancement of scientific understanding, without providing any tangible medical benefit, should not have been assessed as ethically justifiable. Yet, such experiments comprised the great majority of the 91% condoned by the Bateson review panel.

In reaching these conclusions, the panel also differed markedly from a significant number of studies examining the utility or ethics of invasive chimpanzee research (Knight 2007, Bailey 2008, 2009 and 2010, Bettauer 2010 and 2011). Such studies are particularly revealing, because the close phylogenetic proximity of chimpanzees to humans makes them the species most likely to be generally predictive of human outcomes within biomedical research. Yet, it is quite clear that the majority of such experiments do not contribute to important advancements in biomedical knowledge, and rarely, if ever, do they contribute to the development of clinical interventions efficacious in combatting human diseases.

As acknowledged by the review panel, the reliability of their conclusions were also limited by factors such as small NHP study sample sizes, and the relatively small number of studies overall, as well as considerable variation in the research questions investigated, and the experimental methodologies used. These add to substantial criticisms of the methodology and conclusions of the Bateson review recently described elsewhere (Greek *et al.* 2011).

However, the panel is nevertheless to be commended for calling for rigorous review of proposed NHP research protocols, particularly when highly invasive and prolonged, as well as for calling for a range of other positive measures designed to facilitate greater implementation of alternative methodologies, best practice research, housing and husbandry standards, data sharing and output monitoring, and publication of negative results. Also welcome was their call for repeat reviews to be conducted every 10-15 years. Particularly welcome for those seeking to

assess the ethics of invasive NHP research, were their clear and repeated calls for a more honest description of the likely medical benefits of such research by researchers and their funders.

The responses of the funding organisations to these recommendations were generally positive, sometimes citing specific steps taken to ensure compliance. Deeply concerning, however, was their failure to adequately acknowledge or respond to the latter criticisms. The advanced psychological and social characteristics of NHPs place them at particular risk of suffering within laboratory environments and protocols. Accordingly, invasive NHP research is the subject of considerable social concern. It is tolerated by society with increasing unease, and only on the basis that it is truly necessary in advancing important social objectives, of which the most important is clearly human healthcare. For society to accurately assess the merits of such research, and the degree to which it is prepared to permit and fund it, it is essential that it be furnished with accurate information about the costs incurred by the NHP subjects, and the social benefits that accrue from such research — particularly, the medical benefits.

The BBSRC and the MRC jointly fund the majority of NHP research conducted within the UK. They do so on behalf of the British public and government. The privately endowed Wellcome Trust funds most of the remaining NHP research. Their joint failure to acknowledge the depth and significance of this problem clearly requires that society exercise great caution when presented with poorly-substantiated claims of medical utility by researchers or their funding organisations.

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Corresponding author:

Andrew Knight DipECAWBM (WSEL), PhD,
MRCVS, FOCAE
Oxford Centre for Animal Ethics
c/- 189 Liberty Place, Sheepcote St.
Birmingham B16 8JZ, UK
+44-(0)7824 376709
www.AnimalConsultants.org