Title
Experimenting On Individuals Without Their Consent

Permalink
https://escholarship.org/uc/item/1kp253b7

Author
Buyukmihci, NC

Publication Date
2018-11-21

Peer reviewed
Summary

This paper discusses the harmful and fatal use of non-human animals in research. It argues and demonstrates that such use is not scientifically valid if the results are applied to human beings. Alternatives to such use are discussed in the context of being more defensible ethnically and scientifically. It calls for a change in attitude in order to institute available alternatives and develop others.

Keywords: alternative, animal use committee, animal welfare, compassion, ethics, human animal, kindness, morality, non-human animal, research, scientific method, species differences

When people defend using non-consenting beings (in this case, non-human animals) in research, they usually argue their position by listing all the ‘benefits’ which have been and are expected to be derived from such use. In a separate paper on moral concern, I argue why our own sense of morality should prohibit us from using non-consenting beings in research (34). Here, however, I concentrate on primarily scientific arguments.

Curious, but tragic, is the dichotomy of our sensitivity towards, and treatment of, animals of the same species (11, 156). Society has anti-cruelty laws to protect our companion animals from abuse. If you poisoned your dog or burned her or him, you could be prosecuted and punished. If, however, you did the same thing to a dog in the laboratory in the name of science, you would not be punished. What changed when you and the dog walked through the laboratory door? Whereas you may balk at considering human beings and dogs as moral equals, you cannot rationally argue that there exist morally relevant differences between one dog and another. All the substantive ethical considerations which would apply in protecting a dog who happens to be a human companion would apply equally to one who happens not to be.

It often is stated that animals harmed and killed in research are ‘protected’ by review committees and laws. If the same type of ‘protection’ was applied to you, you would appreciate just how ridiculous statements of this sort are (2, 31, 87, 89, 125, 156, 175). Would you consider it protection if someone was legally allowed to subject you to surgery unnecessary for your health or kill you as long as it was in the name of science? When a committee reviewing animal subjects determines that a particular project is ‘reasonable,’ the obvious question begged is, Reasonable to whom? Certainly, no animal, human or other, would knowingly submit to experiments, even if they were non-painful, if they knew that death was the endpoint. Informed consent is a basic ethical tenet of research involving human beings, however we do not allow this with other animals even when they indicate in their own way that they are unwilling subjects (155).

Even if a person who is an advocate for animals is on such a committee, my personal experience on such committees has shown this to be a token gesture because the control of the vote is made up of people who in some way have a vested interest in having the projects done or who do not rigorously apply logical ethical principles in making decisions.

There is no legal ‘protection’ for animals used in research in the way you and I would like to be protected. Not only is it legal to do virtually anything in the name of science, bear in mind that essentially all animals used in research are killed at some point. The Animal Welfare Act, and its various amendments, is essentially the only law addressing this issue and it has exceptions to

---

1 The intent of this review is to demonstrate that reliance on animal research is unnecessary to understand or treat diseases in people. Although some of the references may be considered ‘dated’, not much has changed since those publications in terms of what is being done to animals in the name of science.

2 Emeritus Professor of Veterinary Medicine, University of California and Emeritus Diplomate, American College of Veterinary Ophthalmologists; contact: ncbuyukmihci@ucdavis.edu; Copyright © 2018 Nedim C. Buyukmihci.

3 Purely for the sake of convenience, I may refer to animals other than human beings as “animals”, recognizing that all are animals of one kind or another; there is no intention to imply that any, even a human being, is morally superior or intrinsically more valuable than another.

4 I have been provided anecdotal information about a non-human primate housed at Yerkes Regional Primate Research Center. This individual had been taught to use human sign language. When he or she was placed in a study which involved a painful procedure, it is alleged that he or she signed to the investigator to “stop, it hurts.”
every rule. It primarily dictates from where animals can be obtained, how they are to be cared for during shipment and housing, what size cage can be used, and that they must receive food and water. Even these minimal regulations are not applicable to the vast majority of animals used in research. Invertebrate animals and so-called cold-blooded animals such as fish, reptiles and amphibians are excluded as are birds, mice, rats, horses, sheep, pigs, cattle and goats. The exclusion of mice and rats is particularly perplexing because these animals comprise most of the animals used.

The Animal Welfare Act explicitly states that it is not allowed to interfere with the design or performance of research; this was reaffirmed in the substantive amendments in 1985. It is, therefore, legal to subject animals to unalleviated pain and suffering if it is part of the experiment. It is discouraging that, even though the Animal Welfare Act fails to 'protect' these animals, my colleagues in the biomedical community have consistently and vigorously fought it and all amendments to it, including provisions for non-human primate well-being and exercise for dogs, spending millions of dollars in the process. Ironically, these same people profess to be concerned about the animals.

The National Institutes of Health (NIH) Guide for the Care and Use of Laboratory Animals (Guide), also falls short of providing any meaningful protection for animals used in research (87, 89, 156). It states explicitly that it is not meant to interfere with the design or performance of research, and there are no restrictions on what can be done to animals. The use of analgesics, anesthetics or tranquilizers is not necessary if the researcher deems that such use would interfere with the experiment.

Groups which promote the harming and killing of animals in research routinely mislead the public about the issue of pain. For example, in an undated brochure entitled “Health Research to Benefit People & Animals” (7), the California Biomedical Research Association stated: “Procedures require the use of anesthesia and medication to suppress pain and suffering” even though this is untrue. (emphasis added)

The following are only a few examples of relatively recent research in which painful or other noxious procedures or conditions are imposed upon animals in the name of science: induction of cancer, gastrointestinal ulcers, inflammation of the eye and radiation exposure (22, 44, 49, 51, 69, 94, 116, 171, 175, 182); poisoning (151); extremes of heat or cold (14, 101, 171); forced swimming, sometimes in freezing water (1, 124, 125); burns or other fire-related injury (5, 121); sleep deprivation (53, 132, 133, 140); inescapable and severe electrical shock (2, 55, 60, 124, 181); fighting, sometimes to the death, to study aggression (12, 27, 54, 62, 67, 135, 170, 171, 183). Pain relief is not mandatory and routinely is withheld because it would interfere with the results of the experiments or because it is claimed that we ‘cannot determine the animal is in pain’. There is a growing body of evidence that demonstrates that our present perception on whether animals under certain conditions are in pain is limited because we have not been critical in our assessment (30). Curiously, however, physicians and veterinarians are quick to treat a patient with antibiotics even if there only is a suspicion that an infection is present.

---

5 So-called farm animals are excluded when the research being conducted is considered to be ‘production’ oriented. Although precise figures are not available, ‘farm’ animals appear to be used primarily in this type of research and are, therefore, exempt from the nominal provisions of the Animal Welfare Act.

6 There may be some change in the near future due to a lawsuit brought against the United States Department of Agriculture (USDA) by the Animal Legal Defense Fund and the Humane Society of the United States. These groups argued that there was no legal or biological basis to exclude birds, mice or rats from the regulations resulting from the Animal Welfare Act. In January 1992, U.S. District Court Judge Charles Richey agreed and ordered that the USDA must include these animals in the regulations. The impact of this ruling still is uncertain.

7 Even though this falsehood recently may have been corrected, those making the original statement had to know it was false and apparently were trying to lull the public into thinking that animals used in research do not suffer.

8 For those of you who might argue that the references used are ‘old’ and may not reflect current practice, a quick search for relevant subjects in PubMed will reveal that there has been essentially no amelioration of the suffering inflicted on non-consenting beings.

9 It was not long ago that some surgeons did not even believe that human infants could feel pain. (145).
Even with strict adherence to the law and guidelines, animals do suffer in biomedical research. It is true that certain funding agencies and institutions do not allow the types of studies I have mentioned to be done gratuitously. Nevertheless, if the painful procedure is considered unavoidable and if it is believed that pain relief drugs would interfere with the results, the studies are approved and done (14).

Although not all research using animals is as drastic as some of the examples I have given, there are other issues which make it problematical from an ethical perspective. As previously mentioned, almost all animals used in research eventually are killed, even if it is not necessary for the goals of the project. It simply is expedient to do so.

The animals in question usually are housed under conditions which are inconsistent with their natural inclinations and abilities or with their genetic makeup. They are not free to pursue whatever interests they might have. I have heard the housing of these animals compared with ‘palaces’ which are far better than what homeless people have. This is nonsense: homeless people are not scooped up off the streets and forced into research which results in their death. Regardless of how clean the animals’ quarters are, they still are prisons; you cannot clean up what amounts to a concentration camp and expect that that corrects the underlying problem. For most animals, the quarters are sterile, barren enclosures which do little more than meet the animals' immediate needs of food, water and shelter. These basic needs may not be provided, however, in experiments in which food or water deprivation either is part of the experiment or is part of the ‘training’ process for the animals (110).

The animals’ social, behavioral and psychological needs rarely are met, even though we have ample data on this subject (127). With macaques, for example, the social structure and the opportunity for normal interactions with not only conspecifics (others of their kind) in general, but their family members in particular, is crucial for their physical and psychological well-being. Monkeys housed in breeding or research facilities, however, are always housed in ways that cannot in any meaningful way meet their physical and psychological needs.10 The standard and vast majority of the housing comprise small, barren, steel cages with no meaningful enrichment or opportunities for socialization compared with what the monkeys need as a species. With little opportunity for mental stimulation and physical exercise, these animals almost always develop abnormal and self-destructive behaviors that may include pacing, rocking, swaying, bar biting, and self-mutilation. The self-injurious behavior is often serious enough to require veterinary intervention and can lead to the death of the individual (106). Most singly housed individuals develop one or, usually, more abnormal behaviors (105).

Being deprived of the normal period of maternal relationship has an influence on this (106, 163). In breeding facilities, infant monkeys who are to be used or exported for research are removed from their mothers far sooner than is normal. The normal relationship between mother and infant is several years with respect to providing normal development. This means that these individuals are essentially mother-deprived and develop abnormally as a result. They may be raised in nurseries and display more abnormal behavior than mother-reared subjects and show differences in their chemical makeup (15, 20, 29, 37, 41, 80, 162, 179). These individuals also display a reduced

---

10 One of my colleagues tried to defend this type of housing by pointing out that the primates could see and hear each other through the bars of the cages and thus could ‘socialize’ with one another. I pointed out that most human couples would find this a less than satisfactory living arrangement. The non-human primates in this case had no less demanding social needs than do human primates.

Although recent provisions of the Animal Welfare Act require that the social or psychological needs of primates be addressed, there is little agreement on what those needs may be. Furthermore, the decision on how these provisions are to be met is left to the conscience and willingness of the people using the animals, not someone without a vested interest in the situation. In all cases, the provisions fail substantially short of what these animals could have in a free living situation. In most cases, the provisions result in only short-term relief or are so insubstantial as to be nonsensical. For example, simply placing toys in a cage, which is often done, has been shown to provide no meaningful diversion for these creatures (17).
capacity for dealing with stressors and develop and mature more slowly (58, 65). They also react differently to various medications (42). The mothers themselves show substantial abnormal behavior just by giving birth in captivity (cages) (32). Although the cages for captive monkeys may be within “legal limits” and are “approved” by breeders or researchers, they certainly are not conducive to the well-being of the individuals. This type of housing constitutes extreme privation for these highly intelligent, curious and social creatures (127).

As can be inferred by the biochemical, behavioral and structural differences between normal monkeys and those reared or kept in laboratory cages, the privation endured by these individuals is not only detrimental to them, it also introduces tremendous confounding effects on data which come from them. The same is the case for other species. Even routine procedures such as catching and handling by humans, forced restraint, injections, or repeated blood sampling can cause great anxiety and stress for these animals (119). The animals do not make good research subjects as a result. In addition to the studies cited concerning monkeys, there are numerous other scientific publications showing how factors such as environment and socialization have a profound effect on the results of a particular experiment (24, 36, 68, 74, 93, 111, 142, 144, 154, 159, 169). For example, in a study on atherosclerosis in rabbits, socialization had a profound effect on the development of plaques in arteries (118). Two groups of rabbits were fed a diet which would cause atherosclerosis. One group was housed and cared for in the usual, ‘approved’ fashion. Rabbits in the other group were handled for a short period every day by the investigator. When the rabbits were, regrettably, killed and examined at the end of study, those receiving the extra attention had about 60% fewer plaques in their arteries even though serum cholesterol concentrations and other parameters were similar to the control group. The effects, therefore, are not trivial. These types of findings cast considerable doubt on the validity of much of the published scientific reports in the world literature. Can we assume those data are reliable or are there major flaws caused by the methods of housing and handling the animal subjects (127)?

Those who defend the harming and killing of animals in research state that the individuals are treated “humanely.” This flies in the face of common sense. To be humane is to have sympathy for another, to have mercy, to be tender and kind. If you provide pain relief after you have broken the spine of a cat for an experimental study, how can this be considered humane? If it were not for you, there would have been no pain in the first place. If you think we are treating animals used in research humanely, I suggest you substitute the words “human child” in the place of “animal” for a particular experiment and see if you still consider such treatment “humane,” even if the study is intended to help other children.

When my colleagues admit that animals used in research suffer, they try to justify the suffering by pointing out that human beings are suffering, too. They try to appeal to your emotions by showing you sick children and reducing the issue to a nonsensical “us or them” scenario. There simply is no proof that not using the animals would somehow lead to the death of the children. Perhaps more importantly, is it the fault of other animals that we, too, are subject to disease and death? Why do we believe that because we suffer, innocent others must pay a price? In that context, it appears that the harming and killing of animals in the name of science is merely an expression of unconscionable selfishness on our part, something which goes against all the best qualities of human nature.

Although my colleagues continually cite work which purportedly will “save or improve the lives of human beings or other animals,” most of what is done to animals has no obvious or declared value in this regard, is poorly done (136), the results are heavily biased to conclude more relevance than warranted (97) or simply never is relevant to managing human patients (46). There are many thousands, perhaps millions, of examples of work in which there were profound negative consequences for the animal subjects, but which could not logically be defended by appealing to a

---

11 Some aspects of this study could not be repeated by other investigators (73, 85).
greater societal good which might have come from the work (5, 12, 55, 60, 67, 75, 99, 100, 103, 104, 109, 114, 131, 135, 146, 151, 164, 170, 183).

Also at issue is the scientific appropriateness of using one species as a “model” for another (4, 152). Research involving the induction of diseases in healthy subjects is not scientifically valid. There are reasons why some people, for example, get certain diseases and others living under ostensibly the same conditions do not. When a disease artificially is induced, particularly by overwhelming the subject’s natural defense mechanisms, this cannot mimic the situation where the disease is contracted spontaneously. When the disease is not even a natural one for the animal, this problem is compounded and confounded even further. The differences which allow for contraction of a particular disease by one person, but not by another are not addressed, however these are the very things we should be investigating. The only scientifically credible manner of investigation would be through studying the two populations themselves. One such striking example is the finding of people naturally resistant to rabies in some communities in Peru (70, 178).

Although there are fundamental similarities between, for example, various mammals, there also exist substantial differences. Even a cursory review of the scientific literature reveals that some of these differences would make extrapolation of findings in non-human to human mammals tenuous at best and very dangerous at worst (9, 19, 23, 25, 28, 33, 38, 56, 57, 59, 78, 82, 84, 117, 120, 122, 139, 157, 160, 166, 176, 184, 185).

Although a great deal of money has been, and is being, spent to find so-called cures or treatments for various ailments, relatively little is spent to prevent these ailments even when this is possible. Even the so-called war on cancer has been criticized for its lack of focus on prevention and the poor results (10, 35, 45). Most of the types of cancer which affect human beings allegedly can be prevented (63, 173). often simply by changes in diet from one which is based upon animal products to one which is plant based (98, 149, 177).

Lung cancer and other diseases due to the smoking of tobacco products are still being studied by forcing animals to smoke or use nicotine (66, 76, 77, 96, 143). Paradoxically, we annually spend billions of dollars to promote the use of tobacco products, over half of the money coming from our taxes (45).

The effects of alcohol are being studied by forcing animals to consume alcohol despite the fact that we know the essentials of these effects and can prevent them (12, 43, 47, 50, 79, 89, 102, 148, 158, 168). Animals are forced to take other addictive drugs, even though drug addiction is purely a human phenomenon (18, 39, 50, 62, 64, 86, 93, 108, 115, 126, 164, 183).

Unless we are willing to take advantage of all available opportunities to prevent cancer or other diseases in ourselves, we behave in a morally reprehensible manner if we continue to harm other animals in a search for a “cure”. What kind of a moral statement are we making as our government is cutting funds for mental health and drug addiction programs and then spending millions of dollars for drug addiction studies on animals? What are we saying to people who presently are afflicted with these conditions and cannot obtain treatment because of lack of financial support?

I do not think there is any question that subjecting other animals to the types of things we do in the name of science is fundamentally unethical and immoral. But, is biomedical research using animals necessary for human health and safety? No, it is a choice we make, just like our choice of food or clothing. Will the human species wither and die if we stop harming or killing other animals in the name of science? Although this is what some would have you believe, the idea is absurd. The human species has prospered and increased in numbers dramatically over the millennia despite the fact that biomedical research of any substance has been in effect for only little more
than a century. Although the use of other animals has been associated with our understanding of certain phenomena, it does not follow that this use was necessary or must continue. There is no proof that the advances associated with the use of these animals could not have come about without them. We simply do not know.

It is appalling that my scientist colleagues, who normally have high standards and insist upon solid evidence before accepting something as fact, appear to lose all perspective when it comes to this issue by making sweeping and unsubstantiated statements with respect to the importance of animal research. They often state that virtually every medical discovery has depended upon the use of these animals or could not have been discovered without their use. This is pure speculation on their part. A conscientious scientist would ask if there had been a controlled study comparing advances with and without the use of animals. Such a study is virtually impossible retrospectively. There is no question that the use of animals did play a part, but so did studies on human beings and studies in the physical sciences. No one really knows which aspect had the deciding role or could have been eliminated.

Perhaps the most ignorant and unscientific statement made by many is that discontinuing the use of animals in research would cause science to come to a halt and that we would never find cures for such things as AIDS, cancer or heart disease. How can anyone know that this would be true? Besides, this ignores or denies the numerous discoveries which were based purely on clinical observations of human and veterinary patients (6, 8, 141) or human volunteers (61).

To get a historical perspective on the nature of biomedical research, I urge you to read the book *Who Goes First?* (6). This book was written by Lawrence Altman who is a physician on the faculty at New York University. He is not an animal rights activist, but is someone who has been very interested in the history behind various medical advances. What Dr. Altman points out, with careful documentation, is that many advances in medicine have not depended upon the use of animals, but primarily have come about through experimentation on human beings, often the scientists themselves. His book has been acclaimed by people such as Daniel C. Tosteson, dean of the faculty of medicine at Harvard University and Dr. Michael E. DeBakey, famous heart surgeon and chancellor of Baylor College of Medicine. Dr. Altman did not write this book to defend or criticize animal research and perhaps that is why it is an unbiased look at how medical discoveries we take for granted today really came to be.

Furthermore, most advances, in terms of increasing the longevity and quality of our lives, have not come about through the use of animals, or even from the discipline of medicine (81, 112). The greatest benefits have come from adequate nourishment and proper sanitation. In addition, many of the great medical advances such as penicillin, the X-ray and numerous others came from work which did not initially involve animals.

Unfortunately, regardless of one’s beliefs about the use of animals in research, the reality is that it will continue for the foreseeable future. Therefore, although abolition should be the goal of every compassionate and ethically minded person, the situation must be approached in as practical a manner as is possible. Although regulation of exploitation tends to perpetuate that exploitation, it is of little use to the individuals already suffering, and to those slated for use in the future, to take an all or none stance. There are numerous areas on which progress could be made in reducing animal use and suffering without creating the illusion that human progress will be adversely affected. There is no reason why we cannot, as a society, come to a consensus that certain studies or the use of certain species such as apes or non-human primates in general simply are not permissible, regardless of what we think might be the potential value of the research, because the

---

12 I realize that this is justly criticized as a “speciesist” view. It is unlikely, however, that people will accept prohibiting research on other species at this point in time. Although there is still much resistance, the prospects for prohibiting research using the great apes are promising. There is also increasing public opposition to using other non-human primates.
ethical costs are too great.

Examples of research involving animals which should be summarily discontinued include: 1) those involving unalleviated pain, 2) those involving the use neuromuscular blocking agents, 3) psychological research, 4) drug addiction studies, and 5) the induction of trauma. There simply is no justification to subject any animal to unalleviated pain. Neuromuscular blocking agents afford no anesthesia, but render the animal incapable of moving. Therefore, there always is the risk, even if an anesthetic is used concurrently, that the animal may be conscious and in pain without our knowing it. Animals are inappropriate in the study of human behavior because they are not human beings, and because they are not even themselves when they are locked up in cages and forced to live a life not consistent with their being (13, 127, 130). There are numerous human drug addicts and victims of trauma who need help now and for whom the millions of dollars spent yearly on experimental “animal models” would be of great value.

We need to place greater emphasis on the study of human beings and nature’s “experiments.” For example, suppose one wants to learn more about how myopia (nearsightedness) develops. This could be induced artificially in monkeys by depriving them of vision after birth. Different species of monkeys, however, have markedly different reactions to the same experimental procedure (138). Which, then, is the situation which mimics the human condition? One cannot know from the animal studies. A different approach could use people who have had natural afflictions which fit the design of the experiment, such as people born with cataracts or other opacities of their ocular media.

To determine the connections of the retina to various parts of the brain, one could study a person who has had an eye removed at some point in their life. Sophisticated electrophysiological and biochemical studies can be conducted throughout the person’s lifetime. Later, after the person dies, the brain could be studied, comparing the anatomy and biochemistry with that of a person who had not lost an eye. The same principle can be applied to any situation (123, 172, 174).

The level of sophistication for human studies necessary to understand and treat various diseases is considerable (95, 180). For example, Kiyosawa and coworkers (90), using human volunteers and positron emission tomography, demonstrated a regional reduction in cerebral glucose metabolism in patients with optic neuropathy. Similar technology was used to study cerebral glucose metabolism in patients with depression (16). Others (165) have studied patients with refractory seizure disorders who were undergoing evaluation for therapeutic brain surgery. These patients had had subdural electrode grids implanted. Cortical mapping was done by electrical stimulation of the cerebral cortex in order to learn important neuroanatomical details of the human motor cortex, information virtually impossible to derive from other animals.

Others (128, 129, 134, 147, 153) have used positron emission tomography or magnetic resonance imaging to learn about human brain structure and function, including measuring activity-related changes in regional cerebral blood flow to identify brain regions which are active in human beings during reading or playing the piano. This combination of cognitive and neurobiological approaches has provided information about the functional anatomy of perception, attention, motor control, and language in the human being, again, something not likely to be possible with non-human subjects.

Hewitt and co-workers (137) at the Robert Wood Johnson Medical School are using cultured human skin to study the effects of burns. Kaufman and co-workers (88) at the Brain Imaging Center of McLean Hospital, using magnetic resonance imaging, demonstrated in human volunteers...
that even low-dose cocaine constricts brain blood vessels, sometimes severely, supporting concerns that it can cause either acute or gradual loss of brain cells.

Other techniques that can be used on human beings include transcranial magnetic stimulation to study the functionality of the circuitry and connectivity of the brain (91), diffusion tensor imaging for evaluation of nerve dysfunction (161), magnetoencephalography to study intricate brain function (167) or single photon emission computed tomography to evaluate treatment effects (3). These are just a few of the numerous techniques that are available for getting useful information from and for human beings.

These types of studies provide us with information about human structure, human function and human disease which will be invaluable in understanding and treating human disorders. Even a previous director of the NIH acknowledged that we were relying too heavily on animal research and that we needed to focus on research using human beings (113). These human studies also demonstrate that claims that animals are absolutely necessary are simply not true.14 These and other methods can be used in numerous other disciplines. They can even lead to substantial savings in health care costs to society (72). I bring them to your attention not just to point out specific examples of alternatives to animals.15 More importantly, I want you to see what could be done if there was a change in attitude, a change from one which views other animals as mere “tools” to one which considers them to be deserving of the same respect as human beings. If we did this, then we could concentrate our efforts on improving available alternatives and developing new ones (21, 26, 107). Necessity would become the mother of invention. We could begin the journey out of the Dark Ages of violence and destruction perpetrated without consent and presumably, against the will of individuals in the name of science.

The issue of the use of animals in research is very complex. The individual concerned about the injustice and lack of scientific credibility of the situation can easily become overwhelmed. You can, however, personally do several things to help reduce animal use and suffering. You can strive to buy products which were not tested on animals and which do not contain materials made from them. This can be done with little to no inconvenience on your part. These ethical alternatives are becoming more numerous and easily available. Even if you do not embrace the concept of animal rights or equal consideration for all animals, there is no legitimate reason why you should not choose a product which does what you want it to do, but which is not associated with animal suffering.

You can urge Congress, through your federal Representative and Senators, to stop providing funds for research which has little to no relevance for human health or which is associated with considerable suffering. The major institutions providing funds for research are the NIH and National Science Foundation. Both receive their funds through appropriations from Congress. If Congress would put some stipulations on what categories of research could not be done using public funds, this could go a long way in reducing frivolous animal use and suffering.

We have polluted the earth’s land, air and water. We have destroyed millions of acres of habitat such as rainforests, which destruction will have serious negative effects on us, as well as others. We are responsible for the extermination of billions of animals on a yearly basis. We have caused the extinction of hundreds of species. We have placed the specter of nuclear holocaust on the world. A human being dies every 2 seconds of every day of every week due to malnourishment related conditions, including outright starvation. The importance of biomedical research with respect to human health and the health of the planet, as it is being done today, pales in comparison.

---

14 There even are alternatives to such problematical situations as assessing the neurotoxicity of batches of polio vaccine (40).
15 Some have argued that animals probably were used in the development of some of these methods. As I mentioned earlier, even if this is true, it is unknown whether their use was pivotal. Furthermore, what has happened in the past should be put in perspective. It seems unreasonable to discontinue using something if morally unacceptable behavior no longer is an integral part of it.
When contemplating or discussing the issue of animals used in research, the most important point to consider is that these animals are not "things," they are living beings who share with us the drive to live freely. They are not here for us. They are not our tasters, we are not their kings. Their value does not depend upon their utility to us. Human beings are not the only ones deserving of freedom and the pursuit of their interests. Other animals have just as much right to share the experience we call life. Harming or killing these individuals in the name of science does not make it noble or right. Our own sense of morality demands that our treatment of them be fair and just.

References:


---

Most of the studies involving animals were funded by public money. You can refer to the actual publication to learn which public agency provided the funds. In this paper, I have cited only a few references to document various points because the literature on this subject is substantial.
Use of non-consenting beings in research

N.C. Buyukmihci


40. Chumakov, Konstantin M.; Norwood, Laurie P.; Parker, Monica L.; Dragunsky, Eugenia M.; Ran, Yuxin


Use of non-consenting beings in research

N.C. Buyukmihci

Beyond surgery." Surgery 110(6):923-927.xxxvi


88. Kaufman, Marc J.; Levin, Jonathan M.; Ross, Marjorie H.; Lange, Nicholas; Rose, Stephanie L.; Kukes, Thellea J.; Mendelson, Jack H.; Lukas, Scott E.; Cohen, Bruce M. and Renshaw, Perry F. 1998. "Cocaine-


Use of non-consenting beings in research

N.C. Buyukmihci


152. Seok, Junhee; Warren, H. Shaw; Cuenca, Alex G.; Mindrinos, Michael N.; Baker, Henry V.; Xu, Weiichong; Richards, Daniel R.; McDonald-Smith, Grace P.; Gao, Hong; Hennessy, Laura; Finnerty, Celeste C.; Lopez, Cecilia M.; Honari, Shari; Moore, Ernest E.; Minei, Joseph P.; Cuschieri, Joseph; Bankay, Paul E.; Johnson, Jeffrey L.; Sperry, Jason; Nathens, Avery B.; Billiar, Timothy R.; West, Michael A.; Jeschke, Marc G.; Klein, Matthew B.; Gamelli, Richard L.; Gibran, Nicole S.; Brownstein, Bernard H.; Miller-Graziano, Carol; Calvano, Steve E.; Mason, Philip H.; Cobb, J. Perren; Rahme, Laurence G.; Lowry, Stephen F.; Maier, Ronald V.; Moldawer, Lyle L.; Herrndon, David N.; Davis, Ronald W.; Xiao, Wenzhong; Tompkins, Ronald G. and the Inflammation and Host Response to Injury, Large Scale Collaborative Research Program. 2013. "Genomic responses in mouse models poorly mimic human inflammatory diseases." Proceedings of the National Academy of Sciences of the United States of America 110(9):3507-3512.


180. Wong, Agnes M.F. and Sharpe, James A. 1999. "Representation of the visual field in the human occipital


Use of non-consenting beings in research

N.C. Buyukmihci

i “Rats were tested in the forced swim test to evaluate the effects of duration of exposure (0, 5, 15, or 25 min), and water temperature (0, 35, 30, 25, or 20°C), on a variety of physiological measures.”

ii “All procedures used in this study were approved by the University Animal Welfare Committee.”

The rats were subjected to 2 days of inescapable foot shocks.

iii The results of this study demonstrate the barriers to the accurate prediction from animal studies of the effectiveness of MP in the treatment of acute [spinal cord injury] in humans.

iv Mice were exposed to the smoke created when polyurethane or polyester filled chairs were smoldering (as a result of a burning cigarette left on a cushion) or burning. This caused intense irritation (especially of the respiratory tract) and death over a variable period of time. The level of sensory irritation “…would have been intolerable to humans (i.e. intense eye, nose and throat irritation with lacrimation, coughing, choking, suffocation).”

v In this document, the faculty, who are heavily involved in research and who otherwise vigorously support the use of animals in virtually all experimental research, has made the following statement: “A great deal of our knowledge about disease in general and specifically animal diseases has resulted from studies on naturally occurring diseases in animals under clinical as contrasted to controlled conditions. Major contributions to our understanding of the epidemiology, etiology, processes or mechanism of disease and control and treatment of a wide variety of animal diseases has resulted from proper clinical observations. It is largely through quality clinical research that the veterinary profession acquires new and more effective ways to provide improved veterinary services to society.”

vi This was a news report about medication (encainide, Enkaid®), which had been found to be ‘safe’ in animal studies but killed human beings.

vii “A shift in research emphasis, from research on treatment to research on prevention, seems necessary if substantial progress against cancer is to be forthcoming.”

viii The stated purpose of the study, done at the University of California, was “…to determine how dehydration affects the circulatory and evaporative responses to high ambient temperature in a panting carnivore…” Dogs were surgically manipulated to put in various measuring devices. They were then “…dehydrated rapidly by removal of drinking water for 48-56 (hours), coupled with a period of heavy treadmill exercise every 24 (hours), until 10-11% of the initial body weight had been lost.” They were placed in chambers that heated them up to 45°C (113°F) for 45min. at each temperature. The investigator found “…a marked difference in the behavior…” of normal versus dehydrated dogs. Dehydrated dogs “…lay with the head resting on the forelegs for most of the experiment…and…panted with the mouth open.”

ix Ethanol was given to rats to see if it affected electric shock-induced fighting. It was also given to rats, who then were allowed to kill mice, to see if it had an effect. “…no evidence for an ethanol-induced increase in the two models of aggressive behavior was found.” The investigators admitted that it was not known “…which types of aggression in animals are useful models of aggression in humans.”

x Despite the fact that cold injury associated with alcoholism is “…widely acknowledged…”, these investigators anesthetized mice and froze their tails. The mice were allowed to recover and those who had been pretreated with ethanol had decreased circulation in their tails and most of them died within 14 days. The authors concluded “…that ethanol has significant adverse effects on tissue perfusion and mortality associated with severe murine frostbite.”

xi Studied experimental cocaine addiction.

xii “Many of the problems of loosening, breakage, and wear in human total joint replacements are not evident before 15 to 20 years. The relatively short life span of the available experimental animals will make such research difficult if not impossible.”

xiii “Dogs rarely develop spontaneous lung cancer.” “Mongrel dogs and closely bred beagles…” were given carcinogens or radioactive material. “Early mortality from multiple nonneoplastic causes was variable…additional dogs were frequently added to replace the losses.”

xiv “From an evolutionary point of view, hCG is a young hormone…” Rodents possess neither a bCG gene nor a placental hormone similar to CG…”In consequence, the mouse displays a gestational profile of hormone dependency entirely distinct from humans.”

xv “Animals can communicate with one another through various types of signals. Evidence is presented that in certain experiments with rats, stress as induced by experimental treatment may give rise to the production of signals that affect non-treated animals housed nearby. Such communication between test and control animals may cause biased results and disturbed welfare of the latter. Communication of stress may be prevented by separate housing of control and test animals, but this could introduce another source of bias.”

xvi “It should be clear by now, given the functional and morphologic differences between primate and rabbit eyes, that it can be extremely misleading to attempt to extrapolate findings based on the ocular irritative response of rabbits to other species, especially humans.”

xvii Fear was produced in rats by placing a cat in close proximity. Aggression of the rats towards colony members or strangers was tested in relation to the presence or absence of the cat. Rats were also given electric shocks to their tails to induce aggression. Lacerations of the skin often resulted.

xviii “Moreover discrepancies in the response of the rabbit and human eye impede the extrapolation from animal data to man.”

“Anatomical, physiological and biochemical differences between animals and humans prevent direct prediction of the expected irritation in man from data on experimental animals.”

“…the information that is necessary to prevent a possible hazard to man is the identification of an irritant or a corrosive substance. If this straightforward goal is kept in mind, in vitro techniques will soon provide reliable data for the estimation of the irritancy potential in man.”

xix “Although no clinical signs were detected by postoperative observation, rats inoculated with bacteria were significantly less active in the open field and the duration of freezing behavior was shorter. … These findings underscore the need for sterile techniques in rat surgery to avoid confounding experimental data.”

xx “All irradiation and imaging protocols were reviewed and approved by the Animal Welfare and Research Committee at Lawrence Berkeley Laboratory.”

xxi “The study did not demonstrate target organ toxicity or carcinogenesis which could be extrapolated to other species.”

xxii “…more effort should be directed to certain proved forms of screening and much more effort to prevention.”

xxiii “The mice preferred the most complex cages, and on almost all measures they were less emotional when reared in the more complex cages. Results suggest that a more natural housing environment would lead to healthier animals.”
Most rodent reproductive toxicology studies utilize strains of high fecundity. ...data show that the most fecund strain (Swiss) was affected the least by exposure to EGME, while the least fecund strain (C3H) suffered the greatest declines in fertility. These differences might alter interspecies extrapolation factors, or the permissible exposure levels for humans.

There was an increased rate of spontaneous abortion and pregnancy failure. “The effect on pregnancy outcome of weekly exposure to ethanol in this nonhuman primate is comparable to available data on humans.”

Dogs were given benzo(a)pyrene, N-methyl-N-nitrosourea or both. Some were also given azathioprine and prednisolone to immunosuppress them. Thirty-one of the 54 dogs died. Eighteen died of “...either infectious complications, bone marrow toxicity, and/or generalized debilitation...” (these had been immunosuppressed) “Four dogs...died of...excessive NMU.” “Deaths were also due to anesthesia [2] or massive hemorrhage during endoscopy [2].” “One severely debilitated dog...(had) massive...ascariasis...” Four dogs died of causes unknown even after postmortem exam. None of the dogs developed tumors.

Given the obvious advantage of avoiding cancer, why is more support given to treatment than to prevention?...some reallocation of funds from the biochemical/cellular aspects of treatment towards prevention and broader aspects, seems called for.”

“The features of [fetal alcohol syndrome] are well recognized in humans and encompass a number of ocular malformations... The suitability of the C57Bl/6J mouse as a model of the craniofacial features of human FAS has been previously documented. Twenty-five percent ethanol (vol/vol) in saline solution was administered intraperitoneally to pregnant females at a dose of 0.015 mL/g of maternal body weight. This correlation between early gestational ethanol exposure and alcohol-related birth defects has been documented in humans.”

A human being with a brain lesion acquired accidently and similarly to those created artificially in the macaques was also used.

Dogs in slings were shocked with fifty 7mA (each 15 sec) or forty 5mA (each 5 sec) electric shocks through electrodes in foot pads to see what control or lack of control over the shocks did to their behavior.

“Understanding of the behavioural mechanisms mediating antiChE-induced changes observed in animals is not sufficient to enable extrapolation to humans.”

Based on results following a single dose, female minipigs do not appear to be overtly sensitive to methanol and thus may not be a suitable model for acute methanol-induced neuro-ocular toxicity.”

In 2006, a life-threatening “cytokine storm”, not predicted by pre-clinical safety testing, rapidly occurred in all six healthy volunteers during the phase I clinical trial of the CD28 superagonist monoclonal antibody (mAb) TGN1412. To date, no unequivocal explanation for the failure of TGN1412 to stimulate profound cytokine release in vitro or in vivo in species used for pre-clinical safety testing has been established. Here, we have identified a species difference almost certainly responsible for this disparate immunopharmacology:...we identify a species difference in CD28 expression on the CD4+ effector memory T-cell subset as being more likely responsible for the failure of pre-clinical safety testing of TGN1412 in cynomolgus macaques.”

Volunteers were used for intradermal or subcutaneous injections of the bacteria, inoculations onto superficial scratches or into full thickness skin incisions.

Squirrel monkeys given electric shocks while restrained. They were then given phencyclidine (also known as PCP) to see what effects this psychoactive drug had on the aggression produced by the shocks. The results demonstrated “...individual differences in response to phencyclidine, a difference in effect with repeated dosing and a difference in response when noxious stimuli are presented or not presented.” The investigators found that the results correlated well with human studies.

Although coronary artery disease remains the leading killer in our society, it is still unknown and will never be heard of by four of the five billion people world wide. It is strictly an illness of Western civilization and those of other cultures who have adopted the affluent Western lifestyle. ...Americans consume 135 pounds of fat per year, one ton for every 15 years, and 4 tons of fats and oils have been consumed by age 60. ...When such a life-threatening disease can be promptly arrested, it is perplexing to note the continued emphasis of mechanical measures to treat the disease.”

“...it is apparent that chololithiasis is part of the price of achieving the Western way of life.”

“Nations that consume greater amounts of dietary fat per person have the highest mortality rates from breast cancer...When persons migrate from a nation of low incidence of breast cancer to a nation of higher frequency, these immigrants will have the same high rate of breast cancer as their new nation by the second and third generation...”

“...cancer of the prostate gland, which closely correlates with the epidemiologic factors of breast cancer in terms of fat consumption...”

“...association of fat with an increased incidence of carcinoma of the colon. ... Women who consume red meat daily had a 2.5 times risk of colon cancer compared to those who ate red meat less than once a month. No associated increased risk was noted with vegetable fat. ... Possible mechanisms include the observation that diets high in fat increase the excretion of bile acids...which have been noted in persons with higher rates of colon cancer and polyps...Bile acids act as a tumor promoter. ... bile acid modification by intestinal flora is decreased in vegetarians and those who reduce their beef fat intake...”

“...osteoporosis, a disease of protein excess. ... The women of Bantu who are over 60 years of age do not have osteoporosis. They have a huge calcium drain, having an average of 10 children and nursing each child for 14 months. Their diet includes 440 mg of calcium per day, half of our recommended daily allowance... They are protected because they eat only 50 gm of protein daily. When they begin civilization their protein intake increases and they develop osteoporosis. ...The Eskimo consumes a diet that is high in protein (250 to 400 gm per day) and a diet high in calcium (2000 mg per day); yet, despite much physical activity, they have one of the highest rates of osteoporosis...Millions of Americans have osteoporosis, accounting for 190,000 hip fractures annually... Fifteen thousand women die each year as a result of hip fractures. Despite such data, osteoporosis is unknown in many countries around the world except in Western civilization, which consumes two to three times more protein than required.”

The investigators forced rats to smoke cigarettes and then exercise. Their conclusion was that exercise may reduce the stress created by smoking. This work was supported by the Tobacco and Health Research Institute in Lexington, KY. Male rats were chosen who “...attacked and bit an intruder at least once during this...test...” They were exposed to female rats who were in estrus (heat) but could not be reached by the males, or to females in estrus with copulation to ejaculation being allowed, amongst other conditions. These two situations reduced the time before that particular male would attack an intruder.”
those who were allowed to copulate, there was "...significant elevation of intensity and duration of attack..." 

"Infants born to cocaine abusing mothers may have an increased incidence of sudden, unexplained death... Preliminary data... suggest that pneumocardiograms are abnormal in a high percentage of cocaine exposed infants... Infants born to cocaine abusing women are described as restless and disorganized, suggesting a possible underlying defect in sleep maturation. These studies suggest that the key feature accounting for the possible increased incidence of SIDS in cocaine exposed infants is an abnormality in respiratory control, particularly in mechanisms regulating respiration during sleep."

"The cost of large clinical trials can exceed many millions of dollars, but the savings to society are substantial. The NEI estimates the Diabetic Retinopathy Study to have cost about $10.6 million, but it will generate an annual national savings of about $31 million because of preserved vision. The Macular Photocoagulation Study cost about $1.56 million, but it is estimated to save nearly $57.5 million annually."

"Socializing of chickens to human beings reduced by more than 60% the prevalence of death and pericarditis to a challenge exposure to Escherichia coli. The chickens also had improved feed efficiency and increased antibody response to foreign proteins.

Male dogs had parts of their brains damaged with electrodes. They were then studied to see what effect this had on the development of their sexual behavior. One conclusion was that these lesions can impair the dogs' sexual behavior even though other aspects of their sexuality were not impaired.

The investigators wanted to study the effects of cigarette smoke on the lungs. Many mongrel dogs were used. They were anesthetized and then paralyzed by gallamine (a neuromuscular blocking agent). They had various surgical procedures done and were exposed to cigarette smoke. There was no indication that the dogs were adequately monitored to see if there was adequate anesthesia while they were paralyzed (if not adequate, the dogs would be able to feel but not do anything). There was no mention of what ultimately happened to the dogs. The investigators stated that "...we have demonstrated that inhalation of cigarette smoke caused severe bronchoconstriction in dogs..." However, "...(they) were not surprised..." by this finding. They cited earlier studies in human beings that showed the same results although the results were "...relatively mild..." They surmised that "...dogs (may be) more responsive to cigarette smoke than humans..."

The investigators wanted to learn the effects of cigarette nicotine on the function of the lungs. Mongrel dogs were anesthetized and paralyzed with the neuromuscular blocking agent gallamine. Various surgical procedures were done and various drugs were given in addition to the cigarette smoke. There was no indication that the dogs were monitored to see if the anesthesia was adequate in the face of a neuromuscular blocking agent. If inadequate, the dogs would have been able to feel noxious stimuli but could not do anything about it. There was also no mention of what ultimately happened to the dogs. The investigators found results similar to their previous study (Journal of Applied Physiology 57,1261, 1984). They concluded that nicotine is the "...dominant factor causing bronchoconstriction..."

"In the primate, unlike the cat, the period of maximum sensitivity to visual deprivation does not correspond to a period of rapid cell growth in the LGN."

Jacob A. Brody, dean of school of public health at University of Illinois, Chicago, has stated that it is a common misconception that medicine played an important role in life expectancy increase. "Half the gain in life expectancy [this century] had occurred by 1920, and medicine had nothing to do with it." Antibiotics were not widely available until the late 1940s.

Jerome L. Avorn, a Harvard University Medical School professor cites "the availability of adequate nutrition, of clean water free of sewage, of sufficient housing to prevent crowding and exposure to the elements, and the institution of rudimentary sanitation practices" as being responsible for much of the good health we enjoy.

"It has long been recognized that there are significant individual variations in color vision among humans... We conclude that, if they occur at all, individual variations in color vision among macaque monkeys must be rare."

"...our findings regarding exposure during early life suggest that approximately 17 percent of lung cancers among nonsmokers can be attributed to high levels of exposure to cigarette smoke during childhood and adolescence."

"Research was conducted in compliance with the Animal Welfare Act... and adheres to the principles stated in the Guide for the Care and Use of Laboratory Animals...."

Magnetic resonance imaging was used to study the brain blood vessels in 24 healthy men in their 20s and 30s who reported a history of occasional cocaine use. A single low dose of cocaine was given intravenously and brain function was observed 20 minutes later. It was found that even low-dose cocaine constricts brain blood vessels, sometimes severely, supporting concerns that it can cause either acute or gradual loss of brain cells.

These studies were approved by the Animal Committee at Loyola University Medical School and Hines VA hospital. Animals were housed and experiments were carried out in an AAACAC [sic, AAALAC] accredited facility in accordance with the 'Guide for the Care and Use of Laboratory Animals':

"...eight cats died within the first 30 days of ethanol administration."

The results suggested that social developmental factors could be partially responsible for variation in neurochemical responses and long-lasting differential sensitivity of primates to the psychosis-inducing effects of d-amphetamine.

"Innate nonhuman women, high intakes of animal proteins and red meat were associated with increased risk [of breast cancer]."

Female cats had parts of their brain damaged with electrodes. They were also subjected to removal of their ovaries and uterus. They were given various hormones and then tested to see if they had "male behavior" or to see how they interacted with male cats sexually.

Male cats had parts of their brain damaged with electrodes and then were studied to see what effects this had on their sexual behavior development. One finding was that the effects were similar to those seen in similar work on dogs, but was different from that in rats subjected to the same procedure. Mice were anesthetized and then placed in heated water (about 108F) for as long as 45 min. They were allowed to recover from the anesthesia. This was done twice in some. Many mice died during or immediately following treatment, or within the 7 days after treatment. The investigators did not find specific cause of death, but did necropsies only on "several of the animals" (no histologic...
Use of non-consenting beings in research

N.C. Buyukmihci

The investigators studied the mechanism of erection in mongrel dogs. They were anesthetized and had surgery. There was no mention of what was the final disposition of the dogs. They were able to show how the vascular system was controlled during erection in the dog. The dog’s penis, however, is different from a human’s. Moreover, the control may be different than in a human.

“Long-term exposure to different social stress environments markedly altered ketamine-induced sleep time in chickens.”

“...by the time laboratory medicine came effectively into the picture the job had been carried far toward completion by the humanitarians and social reformers of the nineteenth century... When the tide is receding from the beach it is easy to have the illusion that one can empty the ocean by removing water with a pall.” (This quote is by R. Dubos)

Rats and hamsters were placed in chambers into which tobacco smoke was delivered. They would use their feces to block the smoke from coming in.

Rats were deprived of sleep. Severe reduction of sleep resulted in “...severe pathology and death...”

Referring to the study by Schwartz, et al. (150)

Some of the animals also had part of their brain removed and were muzzled.

Representative of all of its own genus, which raises doubt about extrapolation to higher primates.

Indeed the data may not even be generalisable between similar species of monkey, as comparative research and field studies warrant.

Relating to human disease aetiology. Such generalisation of data from monkey studies to human societies does not appear warranted.

Primatologists themselves have warned repeatedly about over-generalising from primate data to human societies [12], [41], [42]. Indeed the data may not even be generalisable between similar species of monkey, as comparative research and field studies suggest that there are striking differences in group composition, social spacing, dominance and aggression between species [41]. The social and hierarchical behaviour of Macaca fascicularis, the species used in many of these studies, may not therefore even be representative of all of its own genus, which raises doubt about extrapolation to higher primates.

Some of the animals also had part of their brain removed and were muzzled.

Reffing to the study by Schwartz, et al. (150): “Despite the strengths and the Herculean proportions of the animal study, several caveats are warranted.”

“Thus, the conclusions based on the present experimental model may not be relevant to the majority of patients at risk for SCD.”

Rats were deprived of sleep. Severe reduction of sleep resulted in “...severe pathology and death...”

Neuromuscular blocking agents used; no anesthetic. “I don’t know if...(babies)...feel pain...” “I would imagine that some people would feel, at an emotional level, if babies cry, they’re hurting. I’m not sure I can accept that...”

Caffeine was given to mice. “Respiratory arrest usually follows the occurrence of a tonic seizure induced by caffeine treatment.” Mice were also forced to swim in a large beaker of water. “Animals did not appear to drown but to die of respiratory arrest prior to submersion of their heads.”

The incidence of diabetic symptoms was higher in mice reared under sterile condition than under non-sterile condition. It appeared that a difference in animal rearing conditions would affect the sensitivity to EMC virus in mice.

Rats and hamsters were placed in chambers into which tobacco smoke was delivered. They would use their feces to block the smoke from coming in.

The purpose of the present study was to compare the effects of chronic intoxication and the dependence producing properties of halazepam with those of diazepam and nordiazepam in the orally dosed dog.”
The dogs ...were housed and cared for in accordance with the Guide for the Care and Use of Laboratory Animals in an AAALAC approved facility. All studies were carried out according to approved IACUC [animal use committee] protocol.

"The dose of diazepam and nordiazepam was increased until the dogs started to lose weight."

"During the course of the [halazepam] precipitation studies four of these seven dogs died. For this reason another precipitation study was conducted employing four dogs. ... Following its completion the dose was increased to 450 mg/kg/day. Two of these four dogs died during the precipitation studies."

"Soon after flumazenil, the dogs exhibited struggling as well as nuchal and limb rigidity, limb, head and neck tremors, myoclonus, panting, lip-licking, twitches and jerks, stiff tail, urination and salivation as well as seizures in some dogs. ... After the dogs were removed from the sling, rigid and hot-foot walking and ataxia were observed."

"Findings emphasize the risk of error in extrapolations among species and in extrapolations among substrates."

"...wide differences in metabolic or physiological capabilities often exist among species that are classified phylogenetically as closely related, and this is especially so in the biotransformation and disposition of xenobiotics. Extrapolations of biotransformation data among species are prone to grave errors."

"...hepatic enzymatic capabilities toward xenobiotics do not parallel phylogenetic classifications, thus strengthening the view that most of the comparative data available at present is more descriptive than predictive of relationships among species."

"Continuous intoxication was induced by gastric infusion of a liquid diet with up to 47% ethanol in Wistar rats designated "alcoholic."

"Large (more than 16-fold) differences in susceptibility to disruption of juvenile male reproductive development by 17-estradiol (E2) were detected between strains of mice. Effects of strain, E2 dose, and the interaction of strain and E2 dose on testes weight and spermatogenesis were all highly significant (P < 0.0001). Spermatid maturation was eliminated by low doses of E2 in strains such as C57BL/6J and C17/Jls. In contrast, mice of the widely used CD-1 line, which has been selected for large litter size, showed little or no inhibition of spermatid maturation even in response to 16 times as much E2. Product safety bioassays conducted with animals selected for fecundity may greatly underestimate disruption of male reproductive development by estradiol and environmental estrogenic compounds."