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Laboratory animal: biological reagent or living being?

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Abstract

The duties of humans toward non-human animals and their rights in society have been debated for a long time. However, a discussion on the terminology used for the identification of laboratory animals is usually not considered, although the employment of inadequate terminology may generate disastrous consequences for the animals before, during, and after the experiment. This study intends to defend the use of appropriate terminology, call attention to an unethical attitude of certain professionals when dealing with experimental animals, and also propose operational mechanisms, which allow for those distortions to be corrected.

Key words: Ethics; Laboratory animal; Terminology; Animal experimentation

Introduction

The use of non-human animals in teaching, research, and tests of quality control and safety is a controversial subject and has been discussed from an ethical point of view for many years.

The word *ethics* comes from *ethos*, which is the Greek word for *den* or *home of animals*, i.e., the place where animals (in this article, the word *animal* refers to non-human animals) take shelter, protect and disarm themselves, and rest. Later, the term was considered synonymous with *custom* or *habit*, by association with another Greek term, *polis*, which means *social* or *community* and eventually teamed up with another Greek word, *arethai*, which means *character* (1).

There are various definitions of the word ethics. None of them, however, are complete, because they do not fulfill the requirement for clarity of the elements that compose it.

Considering the etymology of the word ethics and one of its definitions, in Western society ethics is a consequence of the moral development of each person, influenced by family, school, environment, and culture; in short, it is a socialization process. This socialization process includes the process of moral development – i.e., the process of appreciation of actions, behaviors, and characteristics of the individual – i.e., the development of the ability to reflect on moral and personal judgments and to choose between right and wrong, just and unjust, good and bad, etc.

Ethics is the overall aim of a life, while morality is the expression of this aim in terms of norms taken to be universal and, at the same time, to exercise some constraint on conduct. Nothing compels, in etymology or history, a distinction between the terms *ethics* and *morality*. Ethics would be the prospect of a complete life, and morality would be the articulation of this perspective on norms characterized simultaneously by a universality claim and a constraining effect. Thus, the adoption of an ethical conduct is much more related to the search for concepts and prejudices acquired throughout life than the attempt to teach ethics as a new piece of information.

Analyzing the definitions of morality and ethics, the conclusion is that, today, the mission of preserving animals from cruel and/or inhuman treatment is much more a matter of putting faith in the nature of people than in the demonstration of scientific techniques, even understanding that the appreciation of those animals is paramount – always – and aiming at an awareness and recognition of the importance of biomedical experimentation by those

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who practice it, as well as the nefarious consequences of the improper use of animals.

Even more interesting is to see how bioethics – which (paradoxically) arose from the need to humanize human medical practices in modern times – can be presented as a new descriptive and normative tool to address the morality of biomedical advances in the context of secular and pluralistic societies, and is fully applied to the practice of laboratory animal science, since those advances involve the use of animal models.

What we intend to discuss here is the issue of the use of misleading terminology to refer to laboratory animals, which often goes unnoticed by the professionals who deal with them and can lead to disastrous consequences for the animals before, during, and after an experiment. We would also like to call attention to an unethical attitude of certain professionals when dealing with experimental animals, as well as propose operational mechanisms, which allow for those distortions to be corrected.

Morality and non-human animals

It is known that morality is the set of rules of conduct pertinent to an age and practiced by a group of human beings. By this definition, it is clear that non-human animals have nothing to do with morals, which is consistent when we have considered that there is a moral development process in humans because of their rational capacity and especially their need to relate to others.

In this direction, various thinkers, including Kant, Piaget, and Kohlberg, have discussed how the moral learning of individuals is conceived. More recently, Puig (2) studied moral education under the perspective of relative and absolute values and concluded that the key aims in this process are: autonomous moral conscience; judgment criteria and fair, supportive moral arguments; the development of critical understanding of personal and social reality; recognition and assimilation of universal values; self-regulation of the will decision, desired habits, and behaviors; information about the explicitness of values; the complex moral identity, i.e., the personal way of being and the recognition and appreciation of belonging to the usual coexistence communities (2).

Thus, assuming that non-human animals do not have this rationality, even though they exercise socialization – of course, within quite distinct concepts – the employment of the concept of morality is unique to humans, and conduct toward other animals depends on the humans.

On the other hand, for some years now the concept of sentience has been attributed to vertebrates (mammals and birds), because they have a central nervous system, which is more complex than the simple nervous system of invertebrates.

However, it is important to emphasize that sentience does not simply mean sensitivity, because, if it did, vegetables, thermometers, photographic film, and even unicellular organisms would be sentient! The condition for an animal to be sentient, besides sensitivity, is the ability to also experience emotions (3).

For VanDeVeer (4), this discussion involves a fundamental issue that determines the acceptance, or not, that animals possess the so-called ‘‘moral status’’ and, if this is accepted, animals then also belong to a ‘‘moral community’’ or ‘‘moral sphere’’, as well as humans, because they have the capacity to experience pain, pleasure, sorrow, and joy... like any human being (4).

The issue would be resolved if everyone thought like VanDeVeer and still considered that animals can be compared to newborn children, or the mentally disabled, or senile persons, who, being human, are also entitled to moral status. But, as mentioned before, there are controversies that lead to deeper discussions and maintain the impasse: Should non-human animals have moral status like that ascribed to humans, or not?

Now, the discussion is no longer grounded on the recognition of sensitivity (animal suffering in particular), but on attributing, or not, the concept of conscience to animals. That is, in addition to sensitivity, animals would also have awareness (5).

Still, according to Galvão (5), Charles Darwin’s considerations would be seriously compromised if consciousness were imagined to be restricted to humans. After all, did the human mind, so rich and complex, come out of nowhere? Or was it the result of the slow and gradual evolution of the simpler minds of other animals, other species?

Despite rejecting speciesism, or discrimination based on species that tends to regard the human species as more important than others, Peter Singer (6) says there are different degrees of moral status among species. This may seem contradictory, but what the author really considers are the interests of the species. Because of human mental capacity, Singer no doubt recognizes that humans have far more expressive interests than the other species, just as the great apes have more interests than dogs, and these in turn have more interests than pigeons, and so on. Therefore, for the author, different considerations must be made when it comes to the ‘‘moral status of animals’’.

For those who defend animal rights, animals should be viewed as living beings endowed with sentience and consciousness and therefore bearing no difference to humans. Everyone (at least humans, birds, and mammals) are ‘‘subjects-of-a-life’’ and should have the right to life and liberty, and the right to bodily integrity (7).

As can be seen, even among authors who defend animals, there are disagreements regarding the moral treatment that should be applied to animals: one line of thought is more concerned with the species’ welfare or interests, while another, more radical one, claims justice for human or non-human animals, without distinction and

without concern for what this might entail for society in general.

Under such circumstances, the use of animals in biomedical practices remains at a stalemate between human duties toward animals and animal rights. Whereas the idea that experimentation causes suffering to animals is common sense – and therefore there is recognition of their moral status – it is up to the professionals involved in this activity to reflect on the ethical and bioethical issues that permeate the practice of laboratory animal science.

Ethics and non-human animals

In research, teaching, and tests of quality control and safety, when the use of animals is essential, Singer's quote is fundamental: ''We are responsible not only for what we do, but also for what we could have prevented, and we should think about the consequences of what we do and also the consequences of what we decide not to do'' (8).

This premise should be considered essential, especially when one takes into account the inability of animals to demand any of their interests or rights, and the fact that they are forced, without exception, to submit to experiments, having humans solely responsible for such actions, interests, or rights.

Discussing ethics only from the deontological standpoint, with moral standards, is no longer sufficient. An ethical behavior is necessary, which requires rationality, but also care.

Having removed the feminist aspect imposed on the ''ethics of care'' theory, which was designed to target the behavior of men and women, it could well be considered in the relationship between humans and animals.

Carol Gilligan (9), author of the theory, discusses the difficulties to resolve an ethical conflict between people when they are only considering rights and rules. She then proposes that the adoption of non-violent relationships and responsibilities to resolve such conflicts be also taken into account, understanding that a man's moral reasoning is turned only to justice (rights and rules), while a woman's is intended to care (responsibilities and non-violent relationships), which should also be considered. This position is consistent with Singer's (8) thinking described earlier, and with concerns about relationships between humans and research animals.

In short, character (ethos), rationality (justice), and responsibility (care) should form a tripod that supports the ethical conduct of those who deal with the science of laboratory animals.

Bioethics and non-human animals

Bioethics originated from modern medicine scientific-technical breakthroughs that may be considered as losing sight of society's cultural and ethical values (10). Later, it was classified as one of three branches of Applied Ethics, which also included the ethics of business, professions and management, and environmental and animal ethics (1).

The concept of bioethics commonly adopted in all kinds of applied ethics is defined as ''The set of concepts, arguments and norms that ethically value and legitimate *human actions*, the effects of which affect, deeply and irreversibly, actually or potentially, living systems'' (our emphasis) (10).

Ethics in animal experimentation has already made considerable progress in many countries, and Brazil is heading in the same direction (11).

Nowadays, we have Russell and Burch's (12) three Rs principle (reduction, replacement, and refinement), the Ethical Principles of the Brazilian Society of Laboratory Animal Science, the Ethics Committee on Animal Use (CEUA) in various scientific institutions in the country, and some legal precepts (13) to protect health and animal welfare. More recently, in July 2012, the National Network of Alternative Methods (RENAMA; http://www.mct.gov.br/index.php/content/view/340586.html) was established for the development and implementation of alternative methods for the use of animals in Brazil and in the world, in a clear demonstration of the commitment of the Brazilian scientific society to contribute to a full ethical posture toward laboratory animals.

In addition, on encouraging the development of alternative methods for the use of laboratory animals, we can consider the recent advances in this area recorded not only by the increasing number of institutions throughout the world, but also by the high investment earmarked for this purpose (14).

However, in Brazil, a mandatory ''science of laboratory animals'' subject matter is still lacking in veterinary medicine colleges at the undergraduate level and in other biomedical courses as an option. Also, of course, we believe that there should be a more emphatic and careful increase in the awareness of ethical conduct of researchers, teachers, technicians, and students in the use of laboratory animals (15).

To discuss the terminology

The total number of animals used for experimental purposes varies worldwide, and many countries, including Brazil, do not have an official record for the use of laboratory animals and their respective purposes. The European Commission report (16) revealed that the number of animals used for experimental goals was over 12 million. Of these, 52% were used in studies of human and animal diseases and 90% were used only for studies of human diseases (16). The Canadian Council on Animal Care (17) recorded a total of approximately 3300 million animals used in 2009, with 19% focused on clinical and applied research and 12% on testing quality control and for teaching purposes. In the United States of America, about 1128 million laboratory animals were used in

experiments, including studies with and without pain (18).

Despite ethical considerations and movements favorable to the three Rs by researchers, an increasing trend in the use of animals in experimentation was observed, sometimes paradoxically, due to the very attempt to use alternative methods to animal use (19,20). Considering the study by Taylor et al. (21), the lack of explicit data on animal use in the world makes it difficult to discuss trends like these, a fact that compromises the full adoption of ethical concepts (21).

Concern about the terms used to identify the species used in experimentation certainly pervades the concern about what moral judgment the professionals working in this practice have in relation to animals.

Many academic texts, grant projects, operating manuals, and other institutional instruments, especially in science, technology, and innovation activities, employ such generic terms to identify the species used in experimentation that this creates a concern about the moral judgment the professionals working with the animals may have in relation to animals. For example, the labels ''product'', ''biological reagent'', ''input'', ''material'', and many other ways to identify the animals used in the studies may not suit the actual condition of the sentient beings that they are and denote a lack of care and responsibility by the professionals involved in the work, who exclude the animals from a moral sphere, disregard the interests or rights of the animals, and underestimate their role in the studies.

In summary, besides being turned into pieces of equipment, those animals are considered inanimate objects, which is nonsense. Furthermore, there are quite a few references that point to the importance of knowledge, by those who work with experimental models, of the anatomical, genetic, physiological, behavioral, and health implications, which will directly act on the results of the studies developed in them (22-24).

When incorrect terminology is used to refer to the animal in an experimental process because of the disregard for ethics by the person responsible for the scientific project, one must also dismiss the possibility that this human being will perform the experiment within a duly elaborate protocol, respecting the biological implications of the animal, because this person's thinking is retrograde and Cartesian, and idealizes the animal as a machine that will respond to that experiment in a preconceived manner.

Of course, this causes a number of harmful consequences to the respective processes and also determines the animal's death, not justifying its use (12,25). However, it is known that reliable and reproducible results are fundamental – and mentioned in various publications and manuals on the care and use of laboratory animals or even in alternative methods – in the case of biomedical research (23,26).

At this point, despite the fundamentalist controversy (3,5), recognition of the moral status of animals, ensuring their health and welfare before, during, and after the experiment, respecting the three Rs, and fulfilling the requirements of a well-designed experiment, will all certainly contribute to success in any study.

Conducting an ethical process for the use of terminology suitable for laboratory animals

A major advance for laboratory animal science in Brazil was Act No. 11.794, 10/08/2008 (13). This law became known as the Arouca Act after the late Sérgio Arouca, an illustrious congressman and renowned sanitarian, and author of the bill in 1995. Today, it rules the procedures for the scientific use of animals throughout Brazil.

After the Arouca Act, the CEUA, mandatory in all institutions of education and research in Brazil, and the National Council for the Control of Animal Experimentation (CONCEA) were established (13).

Two of CONCEA's duties are ''formulating and enforcing compliance with the rules concerning the humanitarian use of animals with purpose of teaching and scientific research'' and ''maintaining updated records of teaching and research procedures conducted or in progress in the country, as well as researchers, from information sent by CEUAs'' (13).

With these powers, CONCEA can standardize the adoption, as a criterion for approval and licensing of research projects submitted to CEUAs, of the mandatory use of the terms *animal*, *laboratory animal*, *non-human animal*, *living being*, *non-human subject*, *model*, *animal model*, or any other term that denotes concern so as not to underestimate the role of such subjects when identifying the species used in these projects.

In turn, it would be up to CEUAs – in addition to performing their function of ''respecting and enforcing, within its mandate, the provisions of this law and other rules applicable to the use of animals for teaching and research, especially in CONCEA resolutions'' (13) – to enjoy the privilege of being an advising and professional ethics training organ to defend this policy and convince those responsible for projects to adjust them to this philosophy, which means only to promote well-being and harmonization of the specific vocabulary of laboratory animal science.

Since the approval of projects in pro-development agencies supporting research and publication of scientific articles in indexed journals already requires their submission to CEUAs, CONCEA's initiative will be spreading this culture and will raise the awareness of professionals working with experiments. These actions are essential to the absolute ethical use of animal models.

Final thoughts

One needs to recognize that the question of ethics in animal experimentation is quite diverse and controversial

and that this is another article in a series of studies that have been developed, always with the intention of finding a solution to the problem, but in reality only stimulating further discussion around it.

There are always favorable and unfavorable facts about the use of laboratory animals: some welcome the great discoveries of human and animal medicine, while others lament the (good or bad) use of animals, and especially their death.

We emphasize here that the terminology adopted for laboratory animals, however irrelevant that may seem – both ethically and practically – shows the nominal relationship that humans use to refer to these animals, and we suggest that it is the onset of the whole matter. After all, from the time the moral status of animals was recognized in human society, it was no longer acceptable that those responsible for the practice of animal experimentation, as well as their subordinates, still treat them like objects by denying them the essential role that they represent in the work and by negating the ethical and moral obligation to respect them.

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