Short Review Article

Laboratory Animal Welfare Approach in Science

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Abstract

The term laboratory animal welfare has been generating a huge amount of controversial questions in science since the very beginning. Humans use animals that are suited to their needs, be they of a psychosocial, therapeutic, official, scientific or nutritional nature. Due to their similarities to human and short life span, the percentage of rodents used for science will correspond to the percentage of similarity between our respective genomes. The era of genetic manipulation led to accelerated and unnatural manipulation of life forms, which was quite shocking for the generations of the last millennium. Yet, it is completely normal today that genetic engineering is applied to living creatures or virtually.

Biomedicine is looking for insights into mechanisms of health preservation, clarity when it comes to development of diseases, prevention of and treatment methods for diseases, researching the environment, and improving the quality of life for mankind. Science observes the phenomena of life in action, and animals change quickly, which makes them appropriate for our objectives. The sheer number of chosen animals with known parameters and bodily responses that can be used in biostatistical analysis, which are expected to help us obtain our results, calls for an approach to animal welfare in science. Alternative methods are being developed through teamwork of researchers and veterinarians in order to find methods that will overall decrease animal pain and suffering to the lowest degree possible, while increasing the possibility of valuable research contributions. Legislative background is available as a starting point and gives researchers basic guidelines for animal welfare categorization.

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Laboratory animal welfare approach in science

The term laboratory animal welfare has been generating a huge amount of controversial questions in science since the very beginning. The idea that a being deliberately changes another being, who is at present healthy and content, into a being that is not sounds controversial as such. On the other hand, one must ask oneself if laboratory animal science is in fact the worst possible mode of animal exploitation for human purposes. The attitude depends greatly on the situation in which the thinker finds themselves and on their knowledge of the animal's actual needs, ensuring that human demands are fulfilled, factors that justify man's involvement and money that one spends on animal maintenance, care and breeding.

Animals do not need humans. If humans had never appeared on the evolutionary tree, a healthy assumption is that none of the animals would ever think: "If only there were people around!" We are the ones who need them; we have absolute control over their exploitation and we place them in isolation from others of their kind in conditions that are suited to our needs, be they of a psychosocial, therapeutic, official, scientific or nutritional nature. If we take a shortcut from synapsids (323 million years ago) to the Cretaceous-Paleogene extinction event (around 66 million years ago), which wiped out most of ectothermic/poikilothermic organisms on Earth, there was a little, primitive rodent that somehow managed to survive (1). Later on, it spread all over the Earth, evolved and, providing that we subscribe to the theory, became human. The most likely relative (Protungulatum donnae) of these ancient humans (1) had a placenta and all other parts that contemporary rodents have, as well as the rest of the animals that we share common ancestry with, which are genetically similar to us. Their bodily responses, reproduction methods, weaning, instincts, curiosity, and nutritional needs are quite comparable to ours.

A species that kept its Pleistocene form until today, and may also be a direct intact living ancestor to our own species is the endemic species, the Balkan snow vole (2). The Balkan snow vole today inhabits high-altitude areas of the Dinarides, in Croatia among other countries, and is categorized as "vulnerable" in IUCN's red list of threatened species (3). Today, as will most likely also be the case for many years to come, the percentage of small rodents used for science will correspond to the percentage of similarity between our respective genomes.

By using selection, we have gained absolute control over the majority of species, in fact over all species that were of any interest to us; it further changes according to fashion and refinement of methods, as well as upgrading of breeding methods (4, 5). The era of genetic manipulation led to accelerated and unnatural manipulation of life forms, which was quite shocking for the generation of the last millennium, yet it is completely normal today that genetic engineering is applied to living creatures or virtually.

If we follow the crossroads towards the science branch, there is a rise of multiple interested parties in search of their own object of research. Biomedicine is looking for insights into mechanisms of health preservation, clarity when it comes to development of diseases, prevention of and treatment methods for diseases, researching the environment, avoiding and preventing the spreading and development of factors that can lead to disease, improving the quality of life for mankind.

A pathological state is any state that differs from the homeostatic state, which would fit the age, gender, psychophysical factors and uninhibited possibility of movement, with the ability to fulfill the basic needs of life. Science requires living animals in order to understand the mechanisms that are preventing those differences. In order to discover as many reasons behind such differences as possible, one must understand the functions of various mechanisms, as well as the integration of said mechanisms on different levels. Molecular mechanisms are constantly in an active state of integration, power and separation in certain cycles, influences and feedbacks. Scientists stick to the parameters

that they can measure and explain by the known laws of physics, biology and other branches of science that observe the phenomena of life in action. By observing life in action, researchers develop methods as tools to prove the accuracy of their hypotheses, which proof also has to be reproducible and applicable to certain mechanisms or groups of mechanisms that are present in their current field of work. By developing methods, scientists produce results, or more accurately, enhance the clarity of further control and manipulation of changes, which can have a larger or smaller impact on the welfare and sustainable development of humanity.

Laboratory animals are placed in the category of materials used in biomedical research. Studying their body mechanisms and inducing controlled changes in them by using different methods leads to various scientific contributions. The choice of certain species, which are chosen by selection methods or by direct influence on their genome, is described in research protocol. Competent bodies and institutions evaluate material, financial institutions decide whether and to which degree obtained results are worth their while. If they are, the project is approved. Justification for extracting the animal from nature (it does not have to be a green or snowy picturesque landscape, it could be the city sewer system, if the purpose is to collect ecological samples) calls for animal welfare in science (6). A controlled lab experiment is done with a familiar animal with a health and breed certificate and produces definite results. Methods like gene modification, drastic, fast, aim applicable or slower selective methods, number of chosen animals with known parameters and bodily responses that can be used in biostatistical analysis, are expected to give us purpose in our results.

Animal welfare can be approached in numerous ways; it has applicable and non-applicable measurements of value, it promotes various debates, inspires blogs and it's even used as a cover for terrorist attacks (7). The role of veterinary medicine does in biomedical science is to ensure that the animals are healthy and the environment is as harmless as could be at the given moment, and it tries to engage in activities with the aim of decreasing the damage in a given situation for all parties involved. This means developing methods through teamwork with competent researchers in order to find methods that will decrease animal pain and suffering to the lowest degree possible, while increasing the possibility of valuable research contributions.

The scientific and professional approach attempts to preserve the balance and the degree to which genetic modifications are used in order to achieve scientific results. The same balance is of use to 3Rs (9) (reduction, replacement, refinement in animal research), so genetics in biomedical research gets huge points in animal welfare, as well. Genetics-related research serves the purpose of developing healthcare, including prevention, diagnostics and treatment, as does the occasional funding for that scope of projects.

From now on, every scientist who declares laboratory animals as a necessary material for their work and cannot achieve their result by using known alternative methods, needs to start with research and personal progress now and consider animal welfare from the start. This offers the possibility of involvement in the right way and through proper channels, because, during future research, it will lead to the work having far better quality, direction and recognition in the end. There are unavoidable guidelines on animal welfare sites, which are being refined on a daily basis and which help researchers express the integrative plan of future research. Refined sites list legislative background to start from and give the researcher the basic starting guideline categorization.

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