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## Global trends of animal ethics and scientific research

**Manshu Jain, Ritu Gilotra and Jitendra Mital**

**Abstract**

This article deals with global trends and guidelines followed by different countries in scientific research. The various objectives of animal research, pros and con and alternative method for animal research by the use of 3Rs are disused here it is felt that however animal research is indispensable in several research but in certain alternative are alternately effective means of animal rights. This article reviews various aspects which are related to this issue.

**Keywords:** Animal models, Ethics, Guideline, Cons

**Introduction**

Humans have benefited from research involving animals, in every medical achievement in the past century. Developments in the many treatments such as diabetes, leukaemia and heart surgery transplants have been possible through the use of animals in research. The majority of the scientific community consider that the use of animals in research justified. The public also now accepts the use of animals in research due to the following reasons:

- They believe now there is no unnecessary suffering to the animals;
- The research is for serious medical or life-saving purposes;

There is no reliable and informative alternative to their use. It is important to recognise that work on animals in research, whose benefits to health and in treatment of disease are not evidenced firstly. This is highly useful as it provides or gives the groundwork or basic structure for medical advances. The moral for animal's research should be to minimise animal suffering and maximise the benefits to medicine, health, agriculture and fundamental understanding of body.

Animal research only takes place within a framework of robust controls. UK legislation requires refining the procedure to keep the minimum suffering of animals, and the use of animals should be that much only which gives meaningful results and the use of animals with non-animal alternatives methods is also appropriate. However, sometimes the use of non-animal methods may not be useful for some types of research. The majority of research using animals is about 84% in which the rodents are important subject for the experiment. Basic research and drug development for 82% of all procedure is safely performed comparing to the remaining 18% research [13-15].

The use of animals in research can be alternative research method evidence that research by using animal is unnecessary. Non-animal methods, such as tissue culture, computer modelling, research using human test subjects and population studies, are used and have utility for scientific and medical research. All the research guidelines which are for animal welfare had very high value for scientific and medical understanding. This is because a research study sometime needs more than knowing how individual molecules, cells or tissues behave, but then too it is unethical and illegal to expose human or animal new medicines knowing that it is benefited or not, so the only alternative method is useful for study of the new entity for health improvement and for treatment of diseased condition. The guidelines which work for animal welfare or for ethical research on animal give the many guidelines on the different level such as Royal Society for animals welfare they give numerous bodies, including government departments, funding agencies, charities and discussion meetings [16, 17].

### Pros and Cons for Animals

Animals are essential for research which is use in cures and treatments of diseases that affect human.

A better life and health is found by the experiment on the animals, but with this good thing comes a bad one too that is experiment on animals some time which lead to chronic toxicity or death of the animal. There are many people and community

who opposing the use of animals in experiments by claiming it as non-ethical way to have an experiment on animals.

This section helps us to know the pros and cons of animal in research:

#### Pros <sup>[1]</sup>

- Animal testing is useful as it contribute in life-saving by cures and treatments in human.

**Case Study:** The California Biomedical Research Association states that nearly every medical breakthrough in the last 100 years has resulted directly from research using animals. Experiments in which dogs had their pancreases removed led directly to the discovery of insulin, critical to saving the lives of diabetics.

- Animal research has also contributed to major advances in understanding and treating conditions such as breast cancer, brain injury, childhood leukaemia, cystic fibrosis, malaria, tuberculosis, leprosy, blood cancer, insulin and many others, and in the instrumental development of pacemakers, cardiac valve substitutes, and anaesthetics.
- Much research cannot be possible without animal studies.

**For Example:** "we wouldn't have a vaccine for hepatitis B without chimpanzees", a disease that kills more than 14,000 people every year in the United States.

- Animals are always used when ethical considerations prevent the use of human subjects, the lives of human volunteers and patient cannot be put in danger unnecessarily. The World Medical Association Declaration of Helsinki states that human trials should be preceded by tests on animals.
- It will be very unethical to perform experimental procedures on human beings before tested on animals, such as in the genetic manipulation experiment to directly impose on human subjects before animal testing.
- Animals themselves get benefit from the results of animal testing, such as if vaccines were not tested on animals, millions of animals would have died from rabies, distemper, feline leukaemia, infectious hepatitis virus, tetanus, anthrax, and parvo virus.
- Animal research is highly regulated, with laws and guidelines to protect the animals in laboratory and research by mistreatment. Such as Animal Welfare Act (AWA) since 1966, these give minimum housing standards for research animals and also work for regular inspections by veterinarians.
- Animal researchers treat animals humanely, both for the animals sake and to ensure reliable test results which will be helpful for human too, as all experiment perform under approval of by an Institutional Animal Care and Use Committee (IACUC)
- Commercially VS Research use of animal.

**Example:** 1. People in the US eat more than 9 billion

chickens and 150 million cattle, pigs and sheep annually, as compare to them only 26 million animals are used for research, in which 95% of which are rodents, birds and fish. As compare to them we eat more than 1,800 times the number of pigs than the number used in research.

Similarly, the use of animal in leather preparation is more than the animal use in research it is approximately more than 15% as compare to research.

#### Cons <sup>[1]</sup>

- Animal testing is cruelty of the human for the animals. As the animal is forced for feeding, forced inhalation, food and water deprivation, prolonged periods of physical restraint, fasting for long period of time, and give them the infliction of burns and other wounds to study the healing process, the infliction of pain to study its effects and remedies, and "killing by carbon dioxide asphyxiation, neck-breaking, decapitation, or other means."
- Is really an inhuman behaviour by human towards the animal?

**For Example:** The Draize eye test, is another method used by cosmetics companies to evaluate irritation caused by shampoos and other products, in this the rabbits being incapacitated in stocks with their eyelids held open by clips, sometimes this test take the long-time not only hours but days too, so they cannot blink the eyes during products testing.

- During LD50 the animal was killed to test the toxicity they were sacrificed after the experiment due to severe condition happened during experiment.

**Case Study:** The US Department of Agriculture (USDA) reported in 2010 that 97,123 animals suffered pain during experiments while being given no anaesthesia for relief, including 1,395 primates, 5,996 rabbits, 33,652 guinea pigs, and 48,015 hamsters, is this correct with animal?

- Alternative testing methods can be used to replace the need for animals. Drugs that pass animal tests are not necessarily safe.

**Case Study 1:** The 1950s sleeping pill thalidomide, which caused 10,000 babies to be born with severe deformities, was tested on animals prior to its commercial release. Later tests on pregnant mice, rats, guinea pigs, cats, and hamsters did not result in birth defects unless the extremely high dose of drug was administered.

**Case Study 2:** Animal tests on the arthritis drug Vioxx showed that it had a protective effect on the hearts of mice, yet the drug went on to cause more than 27,000 heart attacks and sudden cardiac deaths before being pulled from the market.

- 95% of animals used in experiments are not protected by the Animal Welfare Act.

**Such As:** Animal Welfare Act does not cover rats, mice, fish and birds, which comprise around 95% of the animals, used in research they, are small or not necessary as animal what the reason?

- The Animal Welfare Act has not succeeded in preventing horrific cases of animal abuse in research laboratories.

**Case Study:** In Mar. 2009, the Humane Society of the United States (HSUS) found 338 possible violations of the Animal Welfare Act at the federally funded New Iberia Research Centre (NIRC) in Louisiana.

- Medical animal research may still have been made without the use of animals but, there is not enough money and resources to use the alternative method, for this the community working for animal welfare and common people should take the action by participating in the animal welfare issue.
- Statements from Animal Rights Extremist Groups are as follow:

*"I don't think you'd have to kill too many [researchers]. I think for five lives, 10 lives, 15 human lives, we could save a million, 2 million, 10 million non-human lives."*

–Jerry Vlasak, spokesperson for SHAC and ALF

*"In a war you have to take up arms and people will get killed, and I can support that kind of action by petrol bombing and bombs under cars, and probably at a later stage, the shooting of vivisectionists on their doorsteps. It's a war and there's no other way you can stop vivisectionists."*

–Tim Daley, ALF

### Why Use Animals In Research?

#### The experiment on animal is due to several reasons

- First, in some research by studying animal behaviour, we can gain an understanding of human behaviour.
- In a similar manner by understanding the impact of different or many environmental factors such as crowding, cognitive stimulation, enrichment, or deprivation on animal behaviour, by this we understand how these environmental factors affect human behaviour.

**For Example:** The work of Harlow and Zimmerman (1959), In their experiment, infant monkeys was separated from their mothers and kept under two different surrogate conditions; in one condition the surrogate "mother" was constructed of wire with a wooden head, while in the other condition the wire was covered with terry cloth to provide softness and warmth. The experimenters were interested in seeing whether the primary function of attachment to the mother was simply for survival as she provides food. What the studies found was that, regardless of which "mother" provided the food, the baby monkeys spent more time clinging to the terry cloth "mother." By this experiment they concluded that attachment is not merely for survival (food) but for contact comfort: something warm and soft to cling. However, the studies also found that, regardless of which type of surrogate the monkeys had, all developed problems later on. They were either inappropriately aggressive or timid, and the females tended to neglect or abuse their own young. Can we conclude from this study that attachment between human infants and their mothers also goes beyond the simple need for food and survival? In other words, we can say the findings of the Harlow *et al.* studies to human children and hypothesize that a lack of opportunity for contact comfort, or attachment, will also have an adverse effect on human development? The studies conducted by Harlow *et al.*, for example, could not have used human participants for obvious ethical reasons.

- Many of the drug and treatment was developed through the use of animal research are used and it also help in the treatment of animals themselves.

**Example:** Diseases such as tuberculosis, scarlet fever, and polio, not to mention high blood pressure, would continue to claim millions of lives. In addition, According to Perkins, 90% of the animals used in research are rats, mice, and fish, and are bred solely for research purposes.

- Misguided attempts on animals can also have tragic consequences for the animals themselves.

**For Example:** In a recent attack on the animal research laboratory at the University of Minnesota, the animals were "liberated" and set free on a field near the school. Many of the animals were found wandering by the road, hardly a safe environment for animals, and several of the stolen rats were found dead.

- On the basis of this type of issue, animal research does continue, and it is governed by ethical guidelines for research involving human participants is regulated.

### Alternative Method to Avoid Use of Animal

"Alternatives" as encompassing any subjects, protocols, or technologies that '(replace the use of laboratory animals altogether, reduce the number of animals required, or refine existing procedures or techniques so as to minimize the level of stress endured by the animal" [4, 5].

#### Example

- Vitro (in glass) testing, such as studying cell cultures in a petri dish, can produce more relevant results than animal testing on different rodent and non-rodent species because human cells can be used. Micro dosing can be administered to the human who gives the appropriate result on human volunteers, whose blood is then analysed.
- Artificial human skin, such as the commercially available products Epi Derm and Thin Cert, can be used as it is made from sheets of human skin cells grown in test tubes or plastic wells which can produce more useful results than testing chemicals on animal skin as some times result varies animal and between human.

The animals use in scientific research is act as tool in improving the understanding of how biological systems work both in health and disease condition. The developments of new medicines are for both humans and animals, and for the protection of our environment. Hence, it was properly regulated by use of animals in improving the health and lives of humans and animals and to the safety and sustainability of our environment.

This research supports the UK's world-class research base on the environmental, agricultural, medical and other life sciences. The alternative method improves health and diseased condition of patients and animals in the UK by the outcomes of research.

National Health Service is the primary source of research and testing on animals – such as by the licensing of new medicines, and the development of new and safe vaccines and for the detection and control of infectious diseases.

#### For Example

- The development of monoclonal antibody had completely transformed our ability to treat diseases including breast and other cancers.

- Rheumatoid arthritis and multiple sclerosis treatment was also developed by the use of this technology.

It also supports a number of highly skilled jobs in research on the base of an attractive regulatory environment. Economically the life sciences sector contributes over £50bn a year to the UK economy with agriculture contributing £9bn and it underpins the UK's £26bn sector providing us with healthy and wholesome food.

In 2010, the Government made a commitment to reduce the work on use on animals in scientific research. It encompasses Replacement, Reduction and Refinement (the 3Rs) more broadly, putting them at the science-led approach.

Implementing of the 3Rs requires in every research proposal, which include:

- Animals are replaced with non-animal alternatives wherever possible,
- The number of animals used is reduced to the minimum needed to achieve the results sought, and
- For those animals which must be used, the procedure should be refined as much as possible to minimise the suffering of animal.

The scientific imperative for developing new approaches to research and development is very strong. Similarly, there are concerns about the utility of animal studies for testing environmental chemicals.

**For Example:** Animals are exposed to too much higher doses than typical human exposures making interpretation difficult. An international science organisation called for the development of assays that are more predictive to human biology. Attention has focused on non-animal technologies; it include tissue engineering, stem cells, and mathematical modelling [5].

On 18 July 2012, Written Ministerial Statement set our ambition to deliver the commitment such a science-led programme, spearheaded by relevant government departments and agencies, working together where appropriate, and by the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs), an organisation with record in promoting the 3Rs in animal research.

Plan demonstrates how taking advantage of technological developments, including increased computer power and wider scientific innovation, to provide the perfect environment and catalyst for scientific change and progress which will help to reduce the use of animals in research. The Delivery Plan set out the Government three strategic by putting the 3Rs at the science-led programme:

- advancing the use of the 3Rs within the UK;
- using international leadership to uptake and adoption of 3Rs approaches globally;
- Understanding and awareness about the use of animals where no alternatives exist.

Strategic priorities are considered in detail in Section 2 of this Delivery Plan.

In this Strategy UK Life Sciences was published in 2013 whose aim is to make the UK the location for research and development together for manufacturing. This Delivery Plan shows how 3Rs makes a real contribution to realising benefits for humans, animals, environment and sustained economic growth.

**Hence:** for all these above points we use the alternative

methods which help to sustain growth of economic, animals and humans and environment too [6].

### 3Rs

3Rs is proposed by Charles Hume, founder of the Universities Federation for Animal Welfare (UFAW) in 1954, consideration alternatives was made for animal testing on laboratory animal experiments. R.L. Burch and the zoologist W.M.S. Russell is the microbiologist who publishes the work, "The Principles of Humane Experimental Technique" in London in 1959, and the book also defined the animal testing alternatives as "The Three R's: Refinement, Reduction, and Replacement" [7, 8]

Laboratory animals are manly used in following areas:

- **Biomedical Researchers:** use animals to understand the body metabolism and catabolism, disease and health condition of the body, and to develop new vaccines for treatments of various diseases.
- **Industry:** uses animals to test the effectiveness and safety of consumer products

**Such As:** for drugs, cosmetics, household cleaning products, pesticides, industrial chemicals, and for many more test.

- **Educational:** uses include dissecting earthworms or frogs in biology class which are now rarely used, as well as in advanced training of surgical techniques for veterinary and medical students.
- **Psychological Or Social Behaviours Research:** is used for study of animals to learn more about a given species, its biology and behaviour. They may learn from the special skills or abilities of an animal as well such as animal models were used.

**For Example:** Navy researchers have studied dolphin echolocation--their built-in biological sonar system to improve the human-made sonar systems used on board ships. [9]

In the research laboratory an animal may be poisoned; deprived of food, water or sleep; skin and eye irritants were applied; subjected to psychological stress; deliberately infected with disease; brain damaged; paralysed; surgically mutilated; irradiated; burned; gassed; force fed and electrocuted [10, 11].

Replacement of Animals in Medical Experiments (FRAME) considered that the animal experimentation is unacceptable, but the abolition of all animal in experiment is not possible. New consumer products, medicines, and industrial and agricultural chemicals can be tested in order to identify potential of human and animal health, and to the environment. [10]

Alternative methods fall into three broad categories. These are called the 3 Rs

- Replacement,
- Reduction, and
- Refinement.

Replacement is what most people think of when you say "alternatives to animal testing"

- The animals are replaced, either by methods that don't involve animals at all that are called as absolute

replacement.

- By those that use only the cells or tissues of animals that is called as relative replacement.

**Such As:** Many replacement alternatives involve *in vitro* or in glass techniques, where the studies are performed with cells or tissues in culture. If the cells come from human beings, it's absolute replacement, and if from animal it is called as relative replacement [10].

- Replacement also means replacing 'higher' animals with 'lower' animals.

**Such As:** Microorganisms, plants, eggs, reptiles, amphibians, and invertebrates may be replaced by the warm-blooded animals in many experiments.

Live animals may be replaced with non-animal models, i.e. dummies for dissection in teaching the animal or the human body structure, mechanical or computer models, audio-visual aids, or *in vitro* modelling [12].

- Replacement utilizes the pre-existing knowledge for new system to look similarities and for using less expensive animals or models to have research on agents for toxicity or mutagenicity [10].
- Disadvantages for replacement is that if any model are dependent on pre-existing information, the complex physiology and pathology of organism was not known. Hence, research on new biological processes must utilize a living organism; unfortunately, replacement isn't always an option [12, 10].
- **Example of Replacement:** of a replacement alternative is no longer considered an alternative it has become the norm. Not too many years ago, if a woman wanted to find out if she was pregnant, she'd have to get a laboratory test that involved killing a rabbit. Now, she can buy a small kit over-the-counter that tests her urine for certain chemicals the rabbits have been replaced [10, 11].

Reductions mean minimizing or reduce the number of animals needed to perform an experiment or teach a concept.

- In research testing some test cannot perform without animals, at least at this research time. Researchers can also work by reduce the number of animals used in a given study.
- Sometime the uses of far fewer animals are given valid results. These methods include performing pilot studies to determine the potential problems in an experiment before numerous animals are used.
- Designing a study is done by utilizing number of animals by our own control, it include to have a maximum amount of information from each animal, or gathering many or much data from more than one experiment concurrently.
- Statistician consult should be taken for numbers of animals required to achieve significance result during result, or by Minimizing variable condition of animal which affect the result such as, disease, stress, diet, genetics, etc.
- The appropriate species of animal also useful for the data collection, and Replacement should be done whenever it is required or possible [9-10].

Refinement means refining experimental protocols to

minimize pain or distress to the animal whenever it is possible for the experiment.

- For those animals that do undergo testing, scientists may refine their methods to lessen or eliminate pain, distress, or suffering and to make the animals more comfortable. [10]
- Examples of refinement which include it for the identification pain and distress and making plans and executed for preventing or relieving it.
- During measuring the toxicity of a compound or survival can be determined not by death just by chronic toxicity.

**Such As:** A tumour achieves a certain size; at the time of course death is predictable. Subsequent experiments may be utilized the earlier endpoint of tumour size or clinical signs of toxicity, rather than death as the endpoint.

**Refinement Can Be Done By:** [8, 10]

- Receiving adequate or proper training for performing a procedure
- By using proper handling technique for animals.
- By ensuring that drug doses are correct and drugs should not expired,
- The performed experiment on the animal is reasonable for that species.
- Using analgesic and anaesthetics for potentially painful procedures.
- Performing surgeries procedures aseptically to prevent infection.
- Performing only a single major survival surgery on any one animal, whenever possible.

#### Different Alternative Methods

Alternatives to animal use in biomedical and behavioural research fall into four broad categories:

- Continued, but modified, animal use, including a reduction in the number of animals used, improved experimental design and statistical analyses of results, substitution of cold-blooded for warm-blooded vertebrates, substitution of laboratory mammals for domestic or companion mammals, and reduction of pain or experimental insult;
- use of living systems, including *in vitro* cultures (of cells, tissues, and organs) embryos, invertebrates, microorganisms, and plants;
- Use of non-living systems by using chemical or physical systems; and
- Computer simulation.

Biomedical and behavioural had focus attention on drug development by using alternatives rather than animal methods. Alternative methods in research show advantages that can be based on the prospect as follow i.e. on scientific, economic, and humane which include including:

- The number of animals used can be reduced;
- Animal pain, suffering, and experimental insult can be minimized;
- Reduction in investigator-induced and artificial physiological phenomena;
- Using the process which provide more quickly result;
- To perform ability for replicative protocols on a routine basis;

- cost of research reduction;
- alter conditions for flexibility with experimental protocol;

At the same time, these methods are fraught with inherent disadvantages, including:

- Ability of organismal growth process reduces;
- Ability to study cells, tissues, and organ systems reduces by acting in concert;
- Biochemical and metabolic pathways cannot studies;
- Behaviour study on cell tissue or organ cannot possible;
- Study of recovery of damaged tissue cannot possible;
- Interaction between the organism and its environment ability reduces;
- Decrease ability to study of idiosyncratic or species specific responses;
- Drug effect on male and female-specific phenomena cannot be possible; and Different alternative methods are as follow:

### Organ Culture

In history of research, investigators have attempted success in every major and minor organ of mammalian body in variety of research purposes. In last few years, techniques were improved, such as artificial blood media system which helps in, successful organ culture. The applications of organ culture include the study of protein synthesis in lactating mammary tissue [21] and by using human placentas in toxicology studies [18]. Whole organs are not use in long-term *in vitro* culture. The complexity of whole organs makes it impossible for nourishment and for normal function of growth without any external support. Cryostat sections of organ are studies into organ-specific test for metastatic tumour cells. These *in vivo* events reflect the use of whole animals in a very active research area [20]. Whole mammalian embryos are used basic development in biological research and other experiment, which have been cultured *in vitro* for other purposes. Protocols included the effects of hormones and teratogens [22].

### Tissue Culture

Tissues from humans and animal species can be studied in tissue culture. The progress have been achieved in 1907, by R.G. Harrison who studied first frog tissue outside the body for weeks, which had changed the tissue culture from an art of science. Bacteria or virus are alive for more than few hours to gain a better result in the antibiotic study. The tissue culture was extended by controlling bacterial contamination. In tissue culture, isolated tissue of a living organism is maintained by various cells which are arranged as they were in the original organism. Tissue cultures are both “better” and “worse” than a single cell type. They act as better in the manipulation in different natural environment and different cell types which show interaction similar to *in vivo*, as they are worse in more difficult condition to maintain. Tissue-culture experiment requires animal sacrifice, as they are alternative to numerous sections of animal adjoining tissue to use. By this way, two or more research can be performed in the single animal tissue, rather than a number of individual animals. Tissue culture is successfully used in biomedical research. In neurology, embryonic rat tissues are used to examine the destruction of dopamine neurons [25], which is prior to development, as monkey act as best model for the study of degenerative and the other study to degenerative effect observed in humans.

### Cell Culture

It is not a new technique; development and application of cell culture are seen in many past year in different fields. Cell culture every ethic of biomedical research, as well as in clinical practice.

The approaches of biomedical research by cell culture method are as seen:

- Eggs and sperm of many species are used in the study of fertilization and early development [28, 19].
- Mutants are used to understand membrane associated proteins which are essential for knowing animal cell function [29].
- In oncology, bacterial recombinant DNA induces in the transformation of white blood cells which is used to observed infection, cancer, and rheumatoid arthritis [30].
- Steroid metabolism is studied by using rat epididymis cells [31].
- A kidney cell of monkey was use to demonstrate the metabolic effects of many drug [26].
- Surgical research is use to cultured human epitheliums for permanent coverage of large burn wounds has moved from the lab- oratory into clinical trials [32].
- In immunology, studies on antibody synthesis and response have been bolstered by the Nobel-prize-winning elucidation of monoclonal antibodies.

Biologists have developed techniques for the controlled disruption of cells that can leave many organelles intact or allow the harvesting of selected intracellular membranes. These fractions have proved to be invaluable in the search for information at the molecular level.

### For Example

- Microsomal membrane fractions from rat and human liver have been used in comparative anaesthesia research [27].
- The most unique uses of subcellular fractions involves the bringing together of mixed species systems in biochemical studies of protein transport across intercellular membranes.
- Researchers studying intracellular protein translocation used dog pancreatic microsomes, bovine pituitary and rabbit reticulocyte messenger RNA, bacterial nuclease, and a wheat germ cell free system to elucidate the structure of the signal recognition particle [33].

### Ethical Issue [12, 34, 35]

Many ethical issue works in animal research which are explained in the different issue as quarry with solution:

#### ‘Are humans or animal status are different?’

People in large number believe that humans have the high moral status, then animal they believe animals are inferior then humans. However, others disagree and say that this discrimination is having no justification in it. Status of humans and animals can be discussed in following ways:

- One characteristic i.e. self-awareness or rationality.
- Capacity of suffering by animal, which characterised as is an animal’s sentience, or to understand its pain, suffering and pleasure.
- Social relationships of animal should also considered, while many animals differ in these characteristics from humans, and also different between animal to animal.

**‘How can we know how much animals suffer?’**

A recent data show that the amount of pain suffered by animals is more as people think; it is very difficult to understand human concepts and emotions about pain, distress, fear, happiness or affection to animal. Even if we can say that animals have similar brain activity as humans, which means pain suffering in the animal is in the same way.

**‘Can we justify making animals suffer?’**

Many people believes that it is wrong to make animal suffer without reason; but some people think that there is some condition more than the interests of people outweigh the interests of an animal, this justify animal suffers more than enough.

In research using animals, the costs, in the form of suffering, are largely experienced by the animals while any benefits arising from the research are largely directed to human patients.

**Guidelines for Ethical Research** [36-39]

The UK has regulation on research involving animals worldwide. Law of the Animals are (Scientific Procedures) Act 1986. This law was act to protect animal by cause “pain, suffering, distress or lasting harm” must be licensed. ‘Protected’ animals include all vertebrates (mammals, birds, reptiles, amphibians and fish, and octopus). All procedures must carry three separate licenses for the premise; the researcher and the project.

**Licences for research involving animals**

**Premise Licence:** The place where research is conducted must meet standards of animal housing and care and is regularly subject to inspection by the Animals (Scientific Procedures) Inspectorate. In 1999, there were 296 designated premises in the UK.

**Personal Licence:** Any person conducting animal procedures must be competent to do so and must have completed an accredited training course in order to be awarded a licence. This licence specifies which procedures can be conducted and on which species. In 1999, there were around 13,700 active personal licences in the UK.

**Project Licence:** This defines the types of animals which may be used, the estimated number to be used, and the procedures that may be carried out. The licence application

includes details of the purpose of the project, an initial welfare assessment and a limit of severity for each procedure.

**In general, project licences should only be granted if:**

- The research cannot be done without animals;
- The likely costs of the research are weighted against the potential benefits in a cost benefit assessment, and the benefits are deemed to be greater;
- The minimum number of animals will be used;
- Researchers and technicians are trained and experienced in animal testing;
- Research premises have facilities for animal care.

Inspectors visit laboratories to assess licence regulations. There are currently 25 inspectors in the UK, who make more than 2,100 in every year. The independent Animal Procedures Committee (APC) was established to advise the Secretary of State on the operation of the 1986 Act.

**Testing Guidelines**

Testing guidelines are developed for a variety of reasons:

- To allow results of various test substances or species to be easily compared,
- To encourage the use of certain protocols so that testing need not be repeated, and
- To facilitate the work of those who design and carry out tests.

Many organizations differently developed their own testing guidelines.

- FDA Guidelines Involving Whole Animal Testing
- OECD Guidelines Involving Whole Animal Testing
- Pesticide Assessment Guidelines Involving Whole-Animal Testing

Ethical guidelines of animal testing are:

- CPCSEA Committee for the Purpose of Control and Supervision on Experiments on Animals
- CARE Community on Animal Research and Ethics
- GCUASR Guidelines For Care And Use Of Animals In Scientific Research
- NACLAR National Advisory Community for Laboratory Animal Research
- APA American Psychological-al Association

**Table 1:** Different Community Work for the Ethical Guidelines for Animal

	<b>CPCSEA</b>	<b>CARE</b>	<b>GCUASR</b>	<b>NACLAR</b>	<b>APA</b>
<b>Full Form</b>	Committee for the Purpose of Control and Supervision on Experiments on Animals	Community on Animal Research and Ethics	Guidelines For Care And Use Of Animals In Scientific Research	National Advisory Community for Laboratory Animal Research	American Psychological-al Association
<b>Guidelines Followed In Country/ Countries</b>	India	Washington, DC	Indian National Science Academy(India)	Australia, Canada, New Zealand, US,	US
<b>Goal</b>	Guidelines is to promote the humane care of animals used in biomedical and behavioural research and testing with the basic objective of providing specifications that will enhance animal well-being,	Important parts of these endeavours are teaching and research on the behaviour of nonhuman animals, which contribute to the understanding of basic principles underlying	The interest of society and the welfare of animals.	Guidelines set out the responsibilities of all the parties involved in the care and use of animals for scientific purposes, in accordance with	The acquisition, care, housing, use, and disposition of nonhuman animals in research must be in compliance with applicable federal, state, and local, laws and regulations, institutional

	quality in the pursuit of advancement of biological knowledge that is relevant to humans and animals.	behaviour and to advancing the welfare of both human and nonhuman animals.		widely accepted scientific, ethical and legal principles.	policies, and with international conventions to which the United States is a party.
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**Table 2:** Points Covered In Different Guidelines

CPCSEA	CARE	GCUASR	NACLAR	APA
Veterinary care	Justification of the research	Sources of experimental animals	General principles for the care and use of animals for scientific purposes	Justification of the Research
Animal procurement	Personnel	Laboratory animal husbandry and management	Animal housing and management	Personnel
Quarantine, stabilization and separation	Care and housing of animals	Transport of laboratory animals	Procurement and transport of animals	Care and Housing of Laboratory Animals
Animal care and technical personnel	Acquisition of animals	Anaesthesia and euthanasia	Staff at housing and research facilities	Acquisition of Laboratory Animals
Functional areas	Experimental procedures	Disposal of animal carcasses	Veterinary care	Experimental Procedures
Animal husbandry	Field research	Laboratory animal ethics	Responsibilities of institutions and the institutional animal care and use committees (IACUC)	Field Research
Record keeping	Educational use of animals	Legal provision	Responsibilities of investigators	Educational use of nonhuman animals
Laboratory animal ethics	-	-	Responsibilities of teachers	-

**Table 3:** Brief Explanation of All the Guidelines

POINTS	CPCSEA	CARE	GCUASR	NACLAR	APA
Veterinary care	Daily observation of animals,	Care should be done according to "American Veterinary Medical Association (AVMA) Panel on Euthanasia."	The post-operative holding rooms, cages and the care should be under the supervision of a qualified veterinarian.	Investigators must have ready access to veterinary care for the animals at all times.	Care should be done according to "American Veterinary Medical Association (AVMA) Panel on Euthanasia."
Justification of the research	No animal should be used for experimentation for more than 3 years unless adequate justification is provided.	Research should be undertaken with a clear scientific purpose. There should be a reasonable expectation for research.	Research should be undertaken with a clear scientific purpose.	All animals found in a moribund state must be euthanized unless there is specific justification to do otherwise.	Research should be undertaken with a clear scientific purpose. There should be a reasonable expectation for research.
Sources of experimental animals	Institution Biosafety committee and Institutional Animal Ethics Committee.	The USDA and local ordinances should be consulted for source of animal.	The only authentic source of getting right type of animals for research should be from recognized scientific animal facilities	A licensed or otherwise legally permitted source.	The USDA and local ordinances should be consulted for source of animal.
Care and housing of animals	Housing different species in separate rooms; however, cubicles, laminar-flow units, cages that have filtered air or separate ventilation, and isolators shall be suitable alternatives.	The facilities housing animals should meet or exceed current regulations and guidelines (USDA, 1990, 1991), and are required to be inspected twice a year (USDA, 1989).	It is important that they are housed in an isolated building located as far away from human habitations as possible and not exposed to dust, smoke, noise, wild rodents, insects and birds.	Animals should be housed in a manner that facilitates the expression of species-typical behaviour and minimises stress-induced behaviours.	The facilities housing animals should meet or exceed current regulations and guidelines (USDA, 1990, 1991), and are required to be inspected twice a year (USDA, 1989).
Legal provision	The Animal House should maintain records of chemicals, Breeding, stock, purchase, staff, sales records	-	Record should be kept for the breeding, stock, purchase, staff, sales records, death and animal use in experiment.	Record should be available to the personnel providing post-operative care.	-
Functional areas	The size and nature of a facility will determine whether areas for separate service functions are possible or necessary.	Research conducted in populated areas should be done with respect for the property and privacy Of the inhabitants of the area.	-	The area should be according to the experimental protocol.	Research conducted in populated areas should be done with respect for the property and privacy Of the inhabitants of the area.

## Conclusion

The global trend for the use of animals in research is indispensable in several fields hence the use of animals in research should be justified as the animal use in research may be ethical in some way where alternative methods are not known or very expensive. The different methods which are alternatively used are sometimes beneficial sometimes not as seen in animal use too. Hence if an experiment were performed on an animal should be ethical as given in the guidelines for animal.

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