

Student Research Using Live Animals both in the Classroom and for Science Fair Projects

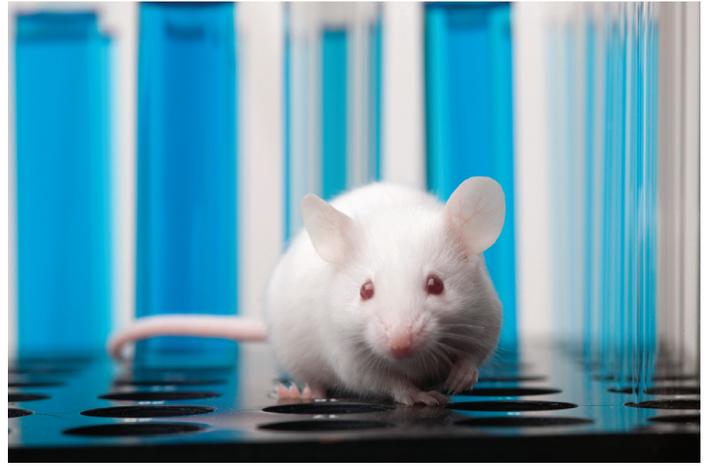
Ethics Overview

Animal research is currently necessary for advancing the treatment of diseases, relieving pain and distress, promoting healthy lifestyles, and advancing basic scientific knowledge. Because animals can feel pain and experience distress it is important to treat them kindly and provide for their needs, especially when they participate in research projects. The ethical principles for animal research subjects are similar to those for human research subjects.

Animals differ from us because they can't voluntarily leave a study and they are often totally dependent on the investigators for their food, housing, care, enrichment and protection from harm. The main ethics related principles for a study using vertebrate animal subjects that are given treatments with the potential for harm are:

- The study must address an *important* problem or need;
- The study must be designed to obtain the needed information with the *minimum* level of pain and distress to the subjects;
- The care and handling of the animals and experimental procedures must be *supervised* by a veterinarian or other qualified animal expert;
- The data analysis must be appropriate to the study so that the results are valid;
- The study must be based on prior knowledge in order to understand the potential for pain and distress, and to achieve the desired results of the study;
- If during the study unexpected harm or distress occurs, the study must be terminated and the animals given proper treatments and care;
- The animals must be observed and examined for pain, distress and well-being at least daily; and
- The study design should be reviewed and approved by an independent expert committee that also monitors progress during the study.

However, students may do studies without formal committee approval and monitoring when the study does not alter the animal's normal life in any way (i.e., when there are *no risks*).



Approval

Studies with live vertebrate animals may require approval by an Institutional Animal Care and Use Committee (IACUC). Colleges, universities, research institutes, government laboratories, pharmaceutical and other companies that perform animal research usually have their own animal housing and IACUCs. Some independent IACUCs are available to review, approve and monitor studies, but most animal studies must be conducted in an approved facility. Approval, if required must be obtained before the study begins.

Responsibilities

Although the person in charge of the study is held responsible for the ethical conduct of all aspects of the project, every person who is involved in the study procedures and care of the animals is also responsible for their own actions. Any institution that approved the study and its IACUC is also responsible for overseeing the research, documenting its approval, monitoring, correcting problems, and reporting serious problems to authorities and any funding agency. Animal studies are almost always performed in institutional laboratories, under IACUC approval and veterinary supervision.

Science Fairs

Science fairs differ in their requirements, but they usually have their own specified rules for animal research projects. In general, they will require IACUC approval for all animal studies that potentially involve modifying the behavior or well-being of animals. Some studies, such as those that collect and analyze observational data without affecting the animals might be exempt from IACUC approval, but it is important to get approval from the fair's officials before starting any study. Visit [Science Buddies](#) and the [Society for Science](#) for additional information and rules and regulations for the use of vertebrate animals in a science fair project.

Alternatives to Animals and the 3 Rs

Many questions of medical and biological significance can be addressed using cell cultures or isolated tissue preparations, existing data, or computer simulations. Animals should only be used after a literature search for alternatives indicates that animals are necessary. Another approach is to do a literature search related to a specific scientific issue and draw new conclusions by performing and writing a “critical review.”

If animals are being considered for a study, a useful concept is the “3 Rs”; *Reduction, Refinement, and Replacement*. All medical researchers in the United States subscribe to the “3 Rs”.

Reduction means that the number of animals used should not be more (or less) than that required to obtain statistically significant results. This is achieved by having a good statistical design. This usually requires consulting an applied statistician. *Refinement* involves care in designing the study and including means for monitoring and for treating pain and distress. *Refinement* is based on prior knowledge, and is important for making sure that the results will be of scientific value, as well as humane. *Replacement* involves the substitution of lower-level subjects (e.g., rodents) for higher-level animals (e.g., dogs, pigs, sheep, non-human primates, etc.) whenever possible. *Replacement* can also refer to the substitution of in-vitro (e.g., cell cultures) systems or computer models. Reviewers of projects and judges at science fairs value the 3 Rs and take them into account when evaluating animal research projects.

Conclusions

In our times, animal research is seen as a tool that develops scientific information that is valuable for relieving pain and distress in people and other animals. Therefore, there is an ethical requirement to conduct it. But, ethical responsibilities involved in animal research are important, because the animals can feel pain and distress. The researchers are in control of the animal’s quality of life, and therefore have important responsibilities. These include good study design, proper care and treatment of the animals before, during, and after the study. Good studies usually add their findings to the scientific literature, or apply the results to solving a defined issue or an important problem.

The results of ethically conducted animal studies have been important for treating disease and improving the quality of life for humans, pets, domestic and wild animals. The rules for conducting such studies vary depending on the level of pain and distress involved. Science fairs, schools, biomedical companies, and research laboratories will have their rules for student research using animals. The highest level of approval is that granted by an Institutional Animal Care and Use Committee (the IACUC). Such approved studies are usually only permitted to be conducted at the



institution that gave the approval. The reason for this is that the institution is responsible for oversight. In general, the only student research with animals that does not require approval and performance in an approved institution, are projects that do not interfere with the life of the animal, or have no possibility of causing pain, death, distress, or any other harm to the subjects.

References

An internet search on “animals, science fair rules,” will return many websites, videos, etc. The rules vary considerably depending on the grade level of the student, and the source of the information, so students should contact the organizers of their specific science fair before starting a project that uses animals.

Some informative representative general references are:

1. Society for Science and the Public. (2021). *Vertebrate Animals*. (societyforscience.org/iseif/international-rules/vertebrate-animals), Washington, D.C.
2. Beal Bank USA, Southern Nevada Regional Science & Engineering Fair (2021). *Science Project Guidelines for Middle School Teachers & Science Fair Coordinators*. (unlv.edu/sites/default/files/24/guidelines-science-teachers.pdf), University of Nevada, Las Vegas, Nevada.
3. Clear Creek ISD Science and Engineering Fair (2021). *Secondary Science Fair Experiment Guidelines*. ([sef.ccisd.net/Secondary%20\(6-12\)/rules_guidelines](https://sef.ccisd.net/Secondary%20(6-12)/rules_guidelines)). Clear Creek ISD, League City, Texas.



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