Animal Care & Use Hints & Tips

Justifying the Number of Animals Used

Appropriate Numbers

The AWAR and PHS policy state that the proposal to use animals must include "rational for involving animals and for the appropriateness of the species and number of animals to be used." PHS policy further specifies that "the animals selected for a procedure should be the minimum number required to obtain valid results." To optimize the value of experiments using animals, the IACUC must consider the justification for doing the experiment at all, as well as the number of animals needed to achieve a meaningful result. The Guide provides the most specific information on what is expected of investigators. It states that "whenever possible, the number of animals requested some assumptions such as the magnitude of the effects.

Non-Duplication

Repetition of experiments is important in certain cases. For example, changes in the available technology can greatly enhance the resolution of data and justify a series of experiments being repeated. Also, comparisons between species are important if certain specific phenomena are to be shown to be more generally applicable. Repetition, which is a direct repeat of a previous study, is less readily justified and investigators are discouraged from such studies by the peer review system for proposals and publications. USDA Policy 12 requires that investigators state that a proposed activity is not "unnecessary duplicative" of previous studies.

Replication within experiments can lead to a seemingly large number of animals being used; however, this may be well justified and necessary. Biological variation in the test system can obscure the effects of a given intervention if the sample size is insufficient to obtain a statistically significant result. For this reason, it is very helpful if a biostatistician reviews proposals, either before submission to the IACUC.

Summary of Requirements

The design must be described in sufficient detail for the IACUC reviews to understand it and to see how the power analysis is configured to match the analysis that will be employed.

Investigators should present and justify the specific parameters and assumptions required by the power analysis. Typically this will involve estimates of effect sizes (such as the mean difference between two groups) and estimates of variability, such as the standard deviation.

Some protocols do not require any statistics. Examples would be histological analyses of tissue and breeding protocols. In these case of tissue a statement such that N animals are needed to provide enough material for all assays to be performed. For breeding an estimate based on past experience or the experiences of others would be sufficient.

Useful Web Sites

The UC Center for Biostatistical Services can assistant investigators in this and other statistical matters.

Interactive Statistical Calculation Pages

Simple Interactive Statistical Analysis (SISA)