**Literature Search for Painful Procedures**

Any procedure that may *potentially* cause more than momentary or slight pain or distress requires a literature search for animal alternatives.

Replacement, reduction, and refinement (the 3R's) must be addressed in your search for alternatives. Alternatives include methods that:

* **replace** your proposed species with non-animal systems or less sentient animal species (e.g., the use of an in vitro or insect model to replace a mammalian model);
* **reduce** the number of animals to the minimum required to obtain scientifically valid data; and
* **refine** animal use by lessening or eliminating pain or distress and, thereby, enhancing animal well-being.

You must provide at least **two sources** of information to show that you have addressed each of the 3R’s. As the USDA noted in a review of some of MU’s teaching protocols: *“This information is required to assess that a reasonable and good faith effort was made to identify and consider any possible alternatives. Multiple searches should be a part of all protocols involving more than momentary or slight pain or distress to the animals used.”*

**One of these sources must be a scientific literature database**. Databases are available via the MU Libraries (<http://mulibraries.missouri.edu>). Databases to consider include:

* MEDLINE (either Ovid MEDLINE or PubMed)
* AGRICOLA
* CAB
* ERIC (for teaching protocols)
* Scopus

**Search Terms to Consider for the 3R’s**

Terms will vary among databases and will depend upon your protocol. Because constructing one search strategy to cover all 3R’s can be unwieldy, it’s best to perform different searches. Note: () = truncation: e.g., reduc() retrieves reduce, reduces, reduction, etc. Different databases use different symbols.

**Replacement**: Substitute current animal with other or non-animal model. *Note: in the replacement search, terms for the species listed in the protocol aren’t used.*

* Animal use alternatives, animal testing alternatives, alternative()
* In vitro, tissue culture, cell culture
* Computer simulation
* Model() (e.g., biological; statistical)
* Mannekin(), cadaver()
* Transgenic plant()
* Replac()

**Reduction**: Minimize the number of animals used without losing statistical power

* Reduc() [near terms like animal, number, research]
* Power analysis

**Refinement**: Techniques to lessen pain and distress

* Animal Welfare
* Pain, stress, distress
* Anesthe(), analges()
* Adverse effects, poisoning, toxicity, safety, complications
* Noninvasive
* Positive reinforcement, enrich(), refin()

Sample searches: <https://www.nal.usda.gov/awic/sample-searches>

For the Literature Database source, you will provide information on: date of search; name of the database; years covered by the search (depending on the protocol, limiting to the last 10 – 15 years is usually appropriate); search strategy.

**Expert Consultation**

If you use expert consultation (e.g., correspondence with an expert, participation in relevant conferences or seminars, etc.) as your second source of information, document date of consultation, name of expert (or conference), qualifications of expert, and specific content of the information.

**Animal Alternatives Narrative**

The written narrative should be such that the ACUC can readily assess whether the search topic was appropriate and whether the search was sufficiently thorough.

If your literature search or expert consultation uncovers a possible alternative and you will not be using that alternative, include your justification for this in the written narrative. *There’s no requirement that the alternatives be used if found; however, a documented effort to identify and consider alternatives is required.*

For more information on the alternatives search, see the MU Libraries guide on animal alternatives at: <http://libraryguides.missouri.edu/alternatives>.

If you would like help with your searches or have any questions about this section, please don’t hesitate to contact me.

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