

NIH Library Tip Sheet: Searching for Alternatives to Painful Procedures Used on Research Animals

This tip sheet is useful for preparing the Literature Search for Alternatives Worksheet.

NIH Librarians can assist NIH and HHS staff with search strategies and selection and use of databases available through the NIH Library website, as well as conduct searches. To request assistance, please go to:

<http://nihlibrary.nih.gov/Services/Pages/AskAQuestion.aspx>.

The NIH Library also offers individual and group tutorials for alternatives in animal research. To request a tutorial, please go to: <http://nihlibrary.nih.gov/resourcetraining/Pages/RequestTutorial.aspx>.

Information in this tip sheet is adapted from material developed by the [Animal Welfare Information Center \(AWIC\)](#).

Searching for Alternatives

Search Strategy

The search strategy has two phases: (1) reduction and refinement, which includes citations pertinent to the PI's field of study, and (2) replacement, which includes the use of non-animal or alternative animal models.

3 R's of Russell and Burch

The Principles of Humane Experimental Technique (1959)

- Reduction—Minimize the number of animals used
- Refinement—Techniques to reduce pain and distress
- Replacement—Substitute animal with non-animal methods

Alternative Terms

The following words may help narrow your alternatives search. Choose words for your particular study. Use a database's appropriate truncation symbol in place of the parentheses () to get variant term endings.

Reduction and Refinement

- advers()
- analges()
- aneshe(), anashe(), anaeshe()
- anxiolytic
- environment(), enrich()
- euthanasia, euthanize()
- handl(), hous(), cag()
- monitor(), device()
- pain(), distress(), stress(), welfare
- positive reinforce()
- reduc(), refin()
- restrain(), restrict(), immobil()
- technique(), method(), procedur(), assay()
- train(), educat(), teach(), instruct()
- tranquiliz()

Replacement

- alternative()
- animal testing alternative()
- animal use alternative()
- assay(), technique(), method()
- bacter()
- cadaver()
- culture() (cell, tissue, organ)
- fish(), cephalopod()
- handl(), hous(), cag()
- invertebrate()
- isolated (cell, tissue, organ)
- mannequin() or manikin()
- model()
- replac()
- simulat()
- software, computer()
- train(), educat(), teach(), instruct()
- video()
- virtual (surgery, reality)
- vitro (method, model, technique)

Commonly used truncation or wildcard symbols:

- EMBASE via Elsevier—exclamation point (!)
behav! finds behave, behavior, behavioral, behaviour, behavioural, etc.
- PubMed, Scopus, and Web of Science—asterisk (*)
bacter* finds bacteria, bacterium, bacteriophage, etc.
- Scopus—a question mark (?) is the wildcard that replaces one letter
analy?e finds analyse or analyze, etc.

Animal Welfare Information Center (AWIC) Tips for Searching for Alternatives

- General area of study
- Species being used
- Describe protocol
- Organ systems involved
- Acronyms
- Names of hormones, enzymes, CAS#, trade names, etc.
- Prominent authors in field, including work published by investigator
- How is the proposed study unique?
- Is the investigator aware of any possible alternatives?
- Any previous searches conducted—keywords used

Databases (*available NIH-wide; +requires a librarian to search and may have associated fees)

Biomedical and Biological

- AGRICOLA*
- BIOSIS Previews+
- CAB Abstracts+
- Current Contents+
- EMBASE*
- Pascal+
- PsycINFO*
- PubMed*/ MEDLINE*
- SciSearch+/Web of Science*
- Scopus*
- TOXLINE*
- Zoological Record+

Pharmaceutical and Technological

- Gale Group Computer Database+
- INSPEC+
- International Pharmaceutical Abstracts+
- NTIS*
- Pharmaceutical News Index+

Additional Websites and Databases

- Altweb
- Animal Welfare information Center (AWIC)
- Defense Technical Information Center (DTIC)
- Department of Defense (DoD) Biomedical Research Database (BRD)
- NIH Office of Animal Care and Use (OACU)
- Norwegian Reference Centre Alternatives Database

Search Evaluation

The PI's Role

- Check terminology, strategy, sources, and dates of search
- Need to review the search results before completing the protocol
- Assess and evaluate the alternative possibilities
- Be prepared to support the use or non-use of any alternatives in writing
- Keep a copy of strategy, databases searched, and years of search for future reference

Red Flags (may lead to rejection of protocol application)

- Only 1 database searched
- Terms only for painful aspects
- The term “alternative” used alone with no other alternative terms
- Keywords listed not relevant to protocol
- Keywords and concepts linked in an incorrect manner
- Search doesn't cover adequate time period (5-10 years)

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