



Searching the Literature for Animal Testing Alternatives

Before doing animal research, investigators are required by the Animal Welfare Act (see USDA's Animal Care Policy 12 at www.aphis.usda.gov/animal_welfare/downloads/policy/policy12.pdf) and the University Committee on Animal Resources (UCAR) to perform a literature search to meet the information requirements.

Miner librarians are available to help with designing search strategies or to do searches for URMIC investigators for free.

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or

Miner Library Reference at 275-2487

Miner_information@urmc.rochester.edu

The Animal Welfare Information Center (AWIC) at the National Agricultural Library (NAL) also provides help with literature searching. Contact:

Animal Welfare Information Center (AWIC) (301-504-6212)

awic@nal.usda.gov www.nal.usda.gov/awic

Reduction, Refinement, Replacement

W.M.S. Russell and R.L. Burch introduced the 3R's in their 1959 book *The Principles of Humane Experimental Technique*.¹ The 3R's represent: **reduction** of the number of animals used, **refinement** of techniques and procedures to reduce pain and distress, and **replacement** of animal with non-animal techniques.

Database Selection and Access

Although MEDLINE®, as provided through PubMed and Ovid, is probably the best database to search, AWIC recommends using multiple databases for a thorough literature search.

These databases are available on the Miner Library website (www.urmc/miner):

Ovid MEDLINE® - MEDLINE is a large database covering biomedical journal literature. The interface includes Ovid MEDLINE 1950-Present with Daily Update, and a separate file for MEDLINE In-Process and Other Non-Indexed Citations.

PubMed - Includes MEDLINE plus additional citations such as In-Process citations and some from additional life sciences journals. PubMed@UR provides access to PubMed as well as links to full-text articles.

Web of Science - Includes Science Citation Index which contains science, technology, and biomedical information.

PsycINFO - Accesses worldwide literature in psychology and related disciplines. Includes experimental human and animal psychology, physiological psychology, and psychological

disorders. This database can be particularly useful to find information about behavioral research.

PrimateLit – Provides bibliographic access to the scientific literature on non-human primates for the research and educational communities. Some subject areas covered are disease models, behavior, physiology, genetics, veterinary science, and colony management. PrimateLit is a free database linked on the Miner Library website under Quick Links “More.”

This database is not available on the Miner website:

EMBASE (fee based) - A large database providing international coverage of biomedical and pharmaceutical literature, with emphasis on European publications. Contact a Miner librarian for more information.

For more free databases, see Free Searchable Databases on the Internet at http://www.frame.org.uk/page.php?pg_id=146 .

Searching Tips

1. **3R's** - Consider all three R's (reduction, refinement, replacement) and not only if the use of animals is necessary.
2. **Questions** -- Examples of questions to consider when searching for animal testing alternatives:
 - Would vitro techniques be feasible?
 - Could pain control be improved?
 - Could computer simulations replace animals?
 - Is there literature on experimental design or statistical models that can lead to a reduction in the number of animals needed?
 - Would environmental enrichment methods reduce animal stress?
 - Can cultured cells or tissue culture be used?
 - If the use of animals is necessary, could a lower species be used?
3. **Search strategies** –Each research protocol requires a literature search. Most searches require at least two strategies:
 - 1) Checking for duplication of research.
 - 2) Determining whether animal testing alternatives (reduction, refinement, or replacement) may be applicable to your research. Examples of subject headings and keywords to search are listed later.
4. **Multiple databases** - A single database is not likely to provide all of the pertinent information on a topic. For a thorough search, consider searching multiple databases.
5. **Documentation** - It is a good idea to keep a copy of your search history (strategy).

- 6. Subject headings** – Citations in databases such as MEDLINE and PsycINFO are assigned subject headings from a thesaurus. MEDLINE uses Medical Subject Headings (MeSH). Indexers assign subject headings based on the content of each article. Ovid and PubMed automatically map your search terms to appropriate subject headings. Databases using subject headings can also be searched by keyword (see tip #5). Use subject headings when appropriate ones are available.

Animal testing alternatives is a subject heading used in the MEDLINE database. **Unfortunately, it is not sufficient to use just this heading in combination with your research topic to complete an alternatives search.** The heading is primarily used to search the topic in general rather than related to specific research.

Examples of MEDLINE Medical Subject Headings (MeSH) to use in Searching for Animal Testing Alternatives

in vitro	"hypnotics and sedatives"
cells, cultured	pain
tissue culture	pain, postoperative
organ culture	stress
computer simulation	stress, psychological
computer assisted instruction	disease models, animal
software	models, animal
artificial intelligence	models, anatomical
manikins	models, biological
animal welfare	models, cardiovascular
animal husbandry	models, genetic
housing, animal	models, immunological
animal testing alternatives	models, neurological
anesthetics	models, statistical
analgesics	

- 7. Keywords** are words or phrases searched in parts of a record such as the title and abstract. Include synonyms and various forms of a word (ex. singular and plural) in your search. Web of Science is an example of a database that needs to be searched using keywords.

Examples of Keywords to Use in Searching for Animal Testing Alternatives

model(s)	computer-aided instruction
alternative(s)	virtual (surgery, reality)
culture (cell, tissue, organ)	training, train
vitro ("in" is often a stop word)	education, educate
caging	software
housing	simulator(s)
pain, painful	simulation(s)
stress, stressful	replace, replacement,
distress	replacing
handling	reduction, reducing
mannequin(s)	refine, refinement
enrich, enrichment (environmental, behavioral)	
anesthetic(s), anaesthetic(s) (also include specific drugs)	
analgesic(s), analgesia (also include specific drugs)	

Saved MEDLINE Search Strategy

Miner Librarians have prepared and saved a search that incorporates the above keywords and subject headings. For information on how to use this search, see the "Saved Search for Animal Testing Alternatives on MEDLINE" handout.

References

1. Russell, W. And R. Burch (1959) *The Principles of Humane Experimental Technique*. Methuen and Company, London.

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