

## Searching for Animal Testing Alternatives

This handout was developed to assist investigators with meeting the information requirements of the Animal Welfare Act and the University of Rochester's University Committee on Animal Resources (UCAR). The goal of the handout is to provide help with searching the literature for animal testing alternatives. While we recognize that many investigators prefer to do their own searches, we encourage them to contact the Reference Department for assistance with designing their search strategies. Investigators can also choose to have their searches done by a Reference Librarian, or through the Animal Welfare Information Center (AWIC) at the National Agricultural Library.

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

### Reduction, Refinement, Replacement

The alternatives to animal testing concept incorporates the 3R's introduced by W.M.S. Russell and R.L. Burch (1959) in their book *The Principles of Humane Experimental Technique*.<sup>1</sup> 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

Many investigators routinely do literature searches on Medline or PubMed, but may not be aware of other databases that can be useful in determining if animal testing alternatives are available. Since no single database is likely to include all pertinent literature on a topic, the use of multiple databases is recommended by AWIC for a thorough literature search. Determining which databases to use depends on the individual research topic. For further information about a specific database or for information on additional databases, please contact a Reference Librarian. Following are some databases to consider:

**Medline** - This is a large, broad database covering biomedical journal literature.

**PubMed** - Includes Medline and citations from additional life sciences journals.

**PsycINFO** - Accesses worldwide literature in psychology and related disciplines. Part of its coverage includes experimental human and animal psychology, physiological psychology, and psychological disorders. This database can be particularly useful to find information about behavioral research.

**ISI Citation Databases (Web of Science)** - Includes Science Citation Index Expanded which contains science, technology, and biomedical information.

**EMBASE** – Is a large biomedical and pharmaceutical database. Provides international coverage of subjects such as drug research, pharmacology, pharmaceuticals, toxicology, clinical and experimental human medicine, environmental health, drug dependence and abuse, psychiatry, and biomedical engineering/instrumentation.

**BIOSIS Previews** - Covers life sciences literature. Examples of subject areas included are biochemistry, biophysics, experimental medicine, genetics, immunology, toxicology, pharmacology, veterinary science, and virology.

### **Database Access**

The Miner Digital Library ([http://www.urmc.rochester.edu/hslt/miner/digital\\_library/index.cfm](http://www.urmc.rochester.edu/hslt/miner/digital_library/index.cfm)) provides access to the library's electronic resources. It contains links to the Ovid databases and some additional databases such as the Web of Science. When connecting to the Digital Library from outside the University of Rochester, a Miner password is needed. UR affiliates can obtain a password by filling out the electronic application form at <http://eg.miner.rochester.edu/apply>. For assistance with obtaining passwords contact Miner's Learning Center at 275-6865. The Miner Library computers have icons on their desktops for direct access to both the Digital Library and Ovid databases. Some databases are available via the Reference Department for a fee. The databases mentioned previously under Database Selection can be accessed as follows:

**Ovid**  
Medline  
  
PsycINFO

**Miner Digital Library**  
ISI Citation Databases  
(Web of Science)  
PubMed (or directly at  
<http://www.ncbi.nlm.nih.gov/PubMed>)

**Available via the Reference  
Department for a fee**  
EMBASE  
BIOSIS Previews

## Searching Tips

- 1. 3R's** - Consider all of the 3 R's (reduction, refinement, replacement) and not only whether the use of animals is necessary.
- 2. Questions** -- Examples of questions to consider when searching for animal testing alternatives:
  - Is it feasible to use in vitro techniques?
  - Can the analgesic regimen be improved to control pain?
  - Are there computer simulations available which can be used to replace animals?
  - Is there literature on experimental design or statistical models, which can lead to a reduction in the number of animals needed?
  - Are there environmental enrichment methods that may lessen animal stress?
  - Can cultured cells or tissue culture be utilized?
  - If the use of animals is necessary, is it possible to use a lower species?
- 3. Search strategies** - Research proposals need to be searched on an individual basis. Most searches will require two strategies. The first is designed to prevent "unnecessary" duplication of research. The second strategy should incorporate subject headings/keywords relevant to animal testing alternatives, which may be applicable to your research. Examples of these subject headings and keywords are listed later in the handout.
- 4. Subject headings** - Databases such as Medline, PubMed, and PsycINFO use subject headings from a thesaurus. Indexers assign subject headings, which describe the content of each article, using the database's thesaurus. Ovid helps you by mapping your search term to appropriate subject headings. You can view the database thesaurus by using the "Tools" icon on the Ovid search screen. Select the "Permuted Index" option. When you type in a word all of the subject headings using the word will be displayed. Some databases using subject headings can also be searched by keyword (see tip #5). It is important, however, to use subject headings when appropriate ones are available.
- 5. Keywords** - Words or phrases are searched in parts of a record such as the title and abstract. It is necessary to include synonyms and various forms of a word (ex. singular and plural) in your search. The ISI Citation (Web of Science) databases are an example of databases that must be searched using keywords.
- 6. Animal testing alternatives and "Animal use alternatives"** are subject headings used in the Medline database. **Unfortunately, it is not sufficient to just use these headings in combination with your research topic to complete an alternatives search.** The headings are primarily used to search the topics in general rather than related to specific research.
- 7. Multiple databases** - A single database is not likely to provide all of the pertinent information on a topic. For a thorough search, consider the use of multiple databases.

**8. Documentation** - It is a good idea to keep a copy of your search strategy. When using the Ovid databases, the strategy can be printed by typing **.ps** in the “Enter keyword or phrase” box. Then click on the print icon.

### **Subject Headings and Keywords for Animal Testing Alternatives**

Depending on the topic and database being searched keywords, subject headings or a combination of both will be needed for an animal testing alternatives search.

Medline is an example of a database that uses subject headings. Indexers assign headings to each article from the *Medical Subject Headings* (MeSH) thesaurus. When appropriate subject headings are available they should be used in the search. **When searching Medline on Miner Library’s Ovid Online system, the AutoExplode feature will automatically search a selected subject heading and all its narrower, more specific terms.** For example, using AutoExplode with liver diseases will search articles discussing liver diseases in general, and also specific liver diseases such as hepatitis B, liver cirrhosis, etc. **To ensure a thorough search, it is generally recommended that AutoExplode be used routinely.**

### **Examples of Medline Medical Subject Headings to use in Searching for Animal Testing Alternatives:**

in vitro	stress
cells, cultured	stress, psychological
tissue culture	disease models, animal
organ culture	models, animal (2001 - )
computer simulation	models, anatomical
computer assisted instruction	models, biological
software	models, cardiovascular
artificial intelligence	models, genetic
manikins	models, immunological
animal welfare	models, neurological
animal husbandry	models, statistical
housing, animal	
animal use alternatives	
animal testing alternatives	
anesthetics	
analgesics	
"hypnotics and sedatives"	
pain	
pain, postoperative	

## Keywords

Keywords are words or phrases searched in part of a record such as the title and abstract. Terms are searched exactly as you enter them. **Important: search synonyms and various forms of a word (such as singular and plural).**

### Examples of Keywords to use in Searching for Animal Testing Alternatives

model(s)	artificial
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, replacing
distress	reduction, reducing
handling	refine, refinement
mannequin(s)	
enrich, enrichment (environmental, behavioral)	
anesthetic(s), anaesthetic(s) (also include specific drugs)	
analgesic(s), analgesia (also include specific drugs)	
computer aided instruction	

### Saved Medline Search Strategy

Many of the subject headings and keywords that can be useful in searching Medline for animal testing alternatives have been gathered together by Miner's Reference Librarians and saved for your use on Ovid. Further information about this is contained on the handout entitled "Saved Search for Animal Testing Alternatives on Medline".

### References

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