**Literature Search for Alternatives Worksheet Instructions**

This worksheet is a tool that will 1) help the PI or researcher with the protocol identify keywords and concepts that are important in the development of a search strategy; and 1) aid in the selection of appropriate topical databases or other on resources. **A list of databases available via the UMBC library is on the last page of this document.**

Protocols should be evaluated on a case by case basis. A perfect strategy to retrieve every citation regarding reduction, refinement, and replacement does not exist. Many factors may affect the outcome of a literature search, including the area of research, species involved, procedures used, chemical(s) tested, experimental design, and whether or not articles have been indexed.

Search strategies for alternatives are divided into two phases: 1) reduction and refinement (unnecessary duplication is addressed here) and 2) replacement. This approach along with conducting literature searches early in the planning stages of the research and animal study will provide the best results (addressing the true intent of conducting searches for alternatives). Keep in mind some database systems allow truncation of keywords using a ? (ie "rodent?" gives "rodent" or "rodents") while other systems use the symbol “ \* ”. Other examples include (vivo or vitro) and (prostat\*) and (cancer or neoplasm\* or tumor or tumour) and (hypertherm\* or heat) and (nano\*) ; (mice or mouse or rats or rat) and (prostat\*) and (cancer or neoplasm\* or tumor or tumour) and (hypertherm\* or heat) and (nano\*).

**Phase 1** - reduction and refinement

The use of analgesics and analgesia, or the use of remote telemetry to increase the quality and quantity of data gathered or humane endpoint for the animals are examples of refinement. Use of shared control groups, preliminary screening in non-animal systems, innovative statistical packages or a consultation with a statistician are examples of reduction alternatives.

Keyword examples for reduction and refinement include:

* analgesic or painkiller or sedative
* anesthesia or anaesthesia or anasthesia
* housing or facility or caging or management
* welfare or well-being or pain or distress
* technique or procedure or method or assay

To create a search strategy to address Phase 1, keywords and concepts from the area of research are used. Because reduction and refinement aspects of alternatives are broad and often are addressed in the methods of studies, the search at this point is really a comprehensive look at the field of study. This in turn addresses whether the protocol is unnecessarily duplicating research.

**Phase 2** - replacement

The key here is to address potential alternatives such as cell culture, tissue culture, models, simulations, etc. as well as look for any alternate animal models lower on the phylogenetic scale that would still give you the data you need, such as fish, invertebrates, etc.

Keyword examples for reduction and refinement include:

* vitro or culture or artificial
* tissue or cell or organ
* virtual or simulation or digital or interactive
* fish or mollusk or cephalopod

Note it is important to recognize that alternatives are not just replacing the animal with a computer simulation or an in vitro procedure. An improved method of restraining the animal which involves positive reinforcement and minimizes the distress involved in capture and restraint is a refinement alternative. A thorough literature search of articles similar to the study proposed may help determine appropriate animal numbers (ie reduction alternative).

**Instructions for section of the worksheet**

**Protocol Title:** The title of the protocol may provide some keywords.

**General area of study:** Keep this broad. These keywords can be used to limit the search to the desired subject area. Examples are cardiac, anesthesia, aids, transgenics, drug testing, cardiology, toxicology, fetal alcohol syndrome, lipid metabolism, etc.

**Type of protocol:** Is the proposed study a research, teaching, or testing protocol? Search strategies for research, teaching, or testing protocols differ. For example, a teaching protocol might include keywords such as "teach, "educate", or "instruct" while a testing protocol could include "safety", "efficacy", or "test".

**Proposed animal species:** The animal model may be used as a keyword in the reduction and refinement phase of the search. At times the animal species is not initially used in the search in order to determine if the study can be done in alternate models. Is there a unique quality or usefulness about your chosen species that warrants its selection? Providing this may provide additional keywords or eliminate the need to search for other possible models being used.

**Describe the experimental protocol including objectives and endpoints:** Provide a complete description of the proposed use of animals. This section should succinctly outline the scientific plan and direction of the experiment. When doing a keyword search on multiple databases, the database system searches for words that appear in the title, abstract, and descriptor fields of the citation. Because the painful part of the procedure may be described in the materials and methods sections, the search should focus on the experimental endpoint or objective in most cases. Exceptions are when methodology papers are common in the field of study (i.e. skin irritation tests, antibody production). Humane endpoints such as indicators of pain or euthanasia can be useful in searches to determine when the animal should be removed from the study. While endpoints are not easily searchable, they are worth considering when reviewing the search results.

**Identify the systems or anatomy involved in the study**: Providing specific systems, parts of the anatomy, or structures (e.g., lung, central nervous system, kidney, etc.), may assist in limiting the search

**List any drugs or compounds used in procedures**: Give specific names of drugs that may be used for study or as anesthetics or analgesics. (i.e. halothane, rompun, buprenorphine, etc.).

Remember to include the scientific and generic name of the drugs. If other compounds in the study, please list them. This is helpful when searching the literature for drugs that may conflict or have contraindications with the area of study. Much of this sort information may not be common knowledge.

**Describe the methods and procedures using animals and the relevance to the study, paying particular attention to those procedures that may cause pain or distress to the animal:** Providing the methods and procedures used in your animal study protocol will assist in addressing issues of refinement alternatives, such as handling techniques, restraint techniques, injection techniques, surgical procedures, etc. Identification of any painful procedure is appropriate at this point, along with what that pain will be relieved with. The law defines a painful procedure as one that would “reasonably be expected to cause more than slight or momentary pain or distress in a human being to which that procedure as applied.” If a procedure involves pain or distress, the PI must consult with the attending veterinarian.

**List any potential alternatives (3Rs of Reduction, Refinement and Replacement):** For example alternate models, modified techniques, housing modifications, modified restraint, in vitro methods, computer simulations, etc.)

**List key keywords/concepts using terminology using responses to questions above:** Keep concepts separate will assist in creating a good search strategy:

Keywords of concept 1 - heart or cardiac or cardiovascular disease (include synonymous terms)

Keywords of concept 2 - atherosclerosis or arterial plaques (include synonymous terms)

**Database selection:** (Choose those that are appropriate for the area of study):

See sample list on the last page of this document.

**Database year(s) of coverage:** The time period searched should be more the 5 years.

**List any other methods used to determine that alternatives are/are not available:** This should be secondary to the literature search, and it may be useful to support or rebuke potential alternatives found in the search. Examples of other sources are: conference attendance, committee membership, professional expertise, training, etc.

**Literature Search for Alternatives Worksheet**

Title of Animal Study Protocol:

General area of study:

Type of protocol:

Proposed animal species:

Describe your experimental protocol including objectives and endpoints:

Identify the systems or anatomy involved in the study

List any drugs or compounds used in procedures

Describe the methods and procedures using animals and the relevance to the study, paying particular attention to those procedures that may cause pain or distress to the animal.

List any potential alternatives (3Rs of Reduction, Refinement and Replacement).

List key keywords/concepts using terminology from your responses to questions above.

Database selection (see next page):

Database year(s) of coverage:  to

List any other methods used to determine that alternatives are/are not available:

Databases available via the UMBC Library

<http://www.umbc.edu/aok/main/index.html#databases>

Agricola (NAL)

Locate journal articles, conference papers, books, audiovisuals, and other resources covering all aspects of agriculture and related science, including: laws & regulations, crops, livestock, research & technology, food & nutrition, marketing, trade, and more.

Toxline (ProQuest)

Indexes and abstracts all areas of toxicology, including chemicals and pharmaceuticals, pesticides, environmental pollutants, and mutagens and teratogens. This version does not contain information from CAS, BIOSIS, or International Pharmaceutical Abstracts.

Medline (EBSCO)

MEDLINE provides authoritative information on medicine, nursing, dentistry, veterinary medicine, the health care system, pre-clinical sciences, and much more. MEDLINE uses MeSH (Medical Subject Headings) indexing to search citations from over 4,800 current biomedical journals.

PsycINFO (EBSCO)

PsycINFO abstracts scholarly journal articles, book chapters, books, and dissertations in the behavioral sciences and mental health. It contains over 3 million records and summaries dating as far back as the 1600s with journal coverage starting in the 1800s, including international material selected from around 2,500 periodicals.

Web of Science

Multidisciplinary database incorporating the Science Citation Index, Arts & Humanities Citation Index, and the Social Science Citation Index. Indexes over 8,000 high impact research journals, many of them peer-reviewed, and provides access to cited and citing references. Additional searchable resources on the Web of Science homepage through the "Additional Resources" tab.

ERIC (EBSCO)

ERIC indexes Current Journals in Education (CIJE)and Resources in Education(RIE), containing more than 1.3 million records and links to more than 323,000 full-text documents dating back to 1966.

LexisNexis Academic

Includes NEWS: major U.S. and world newspapers, broadcast transcripts, foreign language publications, premium blogs and Twitter® feeds, and foreign language publications; LEGAL: law reviews and journals, Federal and State cases and statutes, and Shepard’s Citation Service; and BUSINESS: company profiles and dossiers, and SEC documents.

Thomas Legislative Database from Library of Congress

Congressional news; bill summary, status and full-text; Congressional Record 1994 - pres.; committee information; historical documents and debates; essays on the legislative process; and more.