**Worksheet for a Literature Search**

**Step 1: Collect pre-search information**

Before beginning a Three Rs search, investigators should gather as much information as possible about the proposed animal use (i.e. experiment, test, training procedure). This includes:

1. the working title of the project and the scientific objective(s);
2. a description of the proposed animal model;
3. descriptions of the proposed procedures on animals;
4. descriptions of what could potentially cause pain and distress in the animals;
5. descriptions of any known species-specific considerations;
6. the expected [category of pain](https://www.ttuhsc.edu/research/divisions/integrity-office/animal-care/documents/P04_PainCategories_05-11-18.pdf) Invasiveness;
7. a list of any known potential Replacement, Reduction and/or Refinement alternatives.

**Step 2: Select keywords and concepts**

Keywords are typically found in the title, abstract and descriptor fields of a citation. In a Three Rs literature search they will relate to both the scientific topic under study (e.g. cardiology, rats) and possible alternative methods (e.g. analgesia, cellular).

Search concepts are short combinations of keywords (for example relating to the animal model or expected experimental outcome). Non-specific concepts like “animal testing alternative” and “animal use alternative” may not be useful search terms in many databases.

To generate keywords and concepts:

1. review gathered pre-search information
2. consider all synonyms and different spellings of keywords
3. review one of the following online lists of Three Rs-related search terms:
   * Animal Welfare Information Center [Keywords](https://www.nal.usda.gov/awic/3Rs-terms-examples)
   * NIH Library Tip Sheet: [Searching for Alternatives](https://oacu.oir.nih.gov/sites/default/files/uploads/information-for-acuc-members/nihlibrarytip.pdf) to Painful Procedures Used on Research Animals

**Step 3: Conduct first phase of search**

The first phase is a broad search of both subject-specific information and Three Rs information, with more emphasis on Replacement alternatives. Objectives of the first phase are to:

1. determine if the proposed experiment or test is duplicative
2. search specifically for Replacement alternatives (such as less sentient or non-animal methods)
3. find information about similar scientific uses of animals (which may provide information about possible alternatives, appropriate animal numbers, and what variability to expect) search for information that substantiates the choice of animal model

**Step 4: Review information gathered in first phase**

To evaluate the usefulness of the first phase of the search, review the relevant literature in full rather than just abstracts. This is recommended because often the information relating to Three Rs alternatives is found in the methods section of articles, not abstracts.

**Step 5: Conduct second phase of search**

The second phase is a more focused search for Three Rs information, with greater emphasis on Reduction and Refinement alternatives. It also aims to fill the knowledge gaps identified in step 4. To conduct this phase:

1. review suggestions provided for first phase of search (step 3)
2. visit [Reduction Alternatives](https://3rs.ccac.ca/en/research/reduction/)
3. consult a statistician as necessary
4. visit [Refinement Alternatives](https://3rs.ccac.ca/en/research/refinement/)
5. review [PHS Policy on Humane Care and Use of Laboratory Animals](https://olaw.nih.gov/policies-laws/phs-policy.htm)
6. consult a laboratory animal veterinarian or animal welfare specialist as necessary

**Step 6: Review information gathered in second phase**

To evaluate the usefulness of the second phase of the search, review the relevant literature in full rather than just abstracts. This is recommended because often the information relating to Three Rs alternatives is found in the methods section of articles, not abstracts. To assist in deciding if your search is finished, it may be useful to consider some or all of the [**Questions to assess whether your Three Rs search is complete**](https://3rs.ccac.ca/en/searches-and-animal-index/questions.html).

**Step 7: Finalize experimental plans and animal use protocol**

Incorporate Three Rs alternatives into your animal-based procedures and document the Three Rs search in your animal use protocol. Double-check that your animal use protocol follows the [PHS Policy on Humane Care and Use of Laboratory Animals](https://olaw.nih.gov/policies-laws/phs-policy.htm) and the [IACUC policies](https://www.ttuhsc.edu/research/divisions/integrity-office/animal-care/policies.aspx). Consider how a description of the Three Rs alternatives used could be included in future publications about your work.