

UNIVERSITY OF CALIFORNIA GUIDANCE DOCUMENT

TIPS ON PERFORMING ALTERNATIVE SEARCHES FOR POTENTIALLY PAINFUL PROCEDURES (Question 9 of Protocol – for USDA-covered species)

What should my searches cover?

- You need to search for alternatives and refinements for EACH painful or distressful procedure in your protocol.
- *You will need to perform a new search each time that you do an amendment to add a new painful/distressful procedure.*

Which databases should I use?

- Use appropriate search engines that *do not search the same databases*.
- Google searches generally return too much information and it is NOT recommended to use that method.
- Some good databases to use are:
 - AGRICOLA <http://agricola.nal.usda.gov>
 - CAB Abstracts
 - MEDLINE <http://www.ncbi.nlm.nih.gov/pubmed/> (Note: Medline, Pubmed and PubMed Central all search the same database!)
 - ToxNET
 - EMBASE
 - BIOSIS
 - Scopus and ScienceDirect

How do I use Boolean operators?

Use AND in a search to:

- narrow your results
- tell the database that **ALL** search terms must be present in the resulting records
 - example: cloning AND humans AND ethics

Use OR in a search to:

- connect two or more similar concepts (synonyms)
- broaden your results, telling the database that ANY of your search terms can be present in the resulting records
 - example: cloning OR genetics OR reproduction

Use NOT in a search to:

- exclude words from your search
- narrow your search, telling the database to ignore concepts that may be implied by your search terms
 - example: cloning NOT sheep

Databases follow commands you type in and return results based on those commands. Be aware of the logical order in which words are connected when using Boolean operators:

- Databases usually recognize AND as the primary operator, and will connect concepts with AND together first.
- If you use a combination of AND and OR operators in a search, enclose the words to be connected together in parentheses.
 - Examples:
 - ethics AND (cloning OR reproductive techniques)
 - (ethic* OR moral*) AND (bioengineering OR cloning)

What keywords should I use for my search?

- You need keywords that describe the painful/distressful procedures that the animals will experience. (You, the scientist, can best pinpoint those terms)
- You need keywords that will help you find alternatives to the use of animals or refinement to cause less pain or distress.
- You should use truncation symbols (* or ? depending on your database) to help you find all variants of the word

What are some recommended key words for alternatives?

- | | | |
|------------------------------------|---------------------------------------|-----------------------------------|
| • NOT animal | • Fish*, cephalopod* | • Mathematical model* |
| • Animal testing alternative* | • Amphibian*, reptile* | • Cadaver* |
| • Artificial | • Simulat* (simulation(s), simulator) | • Anesthe*, anasthe* |
| • Vitro (method, model, technique) | • Computer* | • Analges*, sedative, anxiolytic |
| • Culture (cell, tissue, organ) | • Software | • Euthanas* |
| • Isolated (cell, tissue, organ) | • Interactive | • Train*, educat*, teach* |
| • Model* | • Digital image* | • Welfare, pain, stress, distress |
| • Platinat* | • Virtual (surgery, reality) | • Assay*, technique* |
| • Invertebrate* | • Video* (disc, display) | • Method* |
| | • Mannequin* (manikin) | |

How should I write the narrative answer for Question 9?

Alternatives should aim at avoiding or minimizing discomfort, distress or pain without compromising research goals. You should (if at all possible) have at least 4 paragraphs, addressing each of these topics *for each painful/distressful procedure*:

- Refinement techniques that decrease or eliminate pain or distress,
- Replacement with non-animal systems or lower phylogenetic species when possible,
- Reduction in the number of animals required to obtain scientifically valid data through better experimental design, and
- Removal of animals at the earliest possible time point (referred to as humane endpoints) to prevent unnecessary distress or pain.

****Helpful Tip**** **Using MeSH in Medline & Pubmed**

When searching PubMed or one of the other MEDLINE interfaces, it is often a good idea to use the [Medical Subject Headings \(MeSH\)](#) to find relevant articles. MeSH headings are assigned to each article within MEDLINE by its staff and are intended to be consistent across articles. This allows them to return more relevant and consistent groups of articles when searched.

PubMed provides a searchable [MeSH Database](#) to help you identify the best terms for your search, which includes many that apply to a literature search for alternative research methods in animal studies.

If you use a MeSH term, you must tell PubMed that you want it to be a MeSH term and not something else. To do this, type the term inside quotation marks followed by [MESH]. See below for examples.

Sample standard MeSH keywords (click on the keyword to see the MeSH definition, if available):

"Animal Testing Alternatives"[MESH]	"Investigative Techniques"[MESH]
"Animals, Laboratory"[MESH]	"Laboratory Animal Science"[MESH]
"Animal Welfare"[MESH]	"Models, Animal"[MESH]
"Anesthesia and Analgesia" [MESH]	"Research Design"[MESH]

Using MeSH Terms

MeSH terms can be combined to produce generalized searches for major topics in animal testing, including the health, welfare, and housing of animal subjects. Listed below are some sample searches for major issues of interest in your literature search.

Blood Sampling: "blood specimen collection/methods"[MESH] AND "animals, laboratory "[MESH] "

Transgenic Mice: "mice, transgenic"[MESH] AND ("animal welfare"[MESH] OR "Animal Testing Alternatives"[MESH])

Pain and/or Stress Prevention and Control: ("stress, physiological/prevention and control"[MESH] OR "pain/prevention and control"[MESH] OR "stress, physiological/veterinary"[MESH] OR pain/veterinary"[MESH]) AND "animal welfare"[MESH] AND ("animals, laboratory"[MESH] OR "research design"[MESH])

Analgesia: "Anesthesia and Analgesia" [MESH] AND gastrointestinal bypass