

# **AWIC SUPPORTS THE DISCOVERY OF NEW APPROACH METHODOLOGIES (NAMS)**

May 21, 2024

---

For 2024 ICCVAM Forum

Presented By:  
Jessie Carder, AWIC Coordinator  
U.S. Department of Agriculture (USDA),  
National Agricultural Library (NAL),  
Animal Welfare Information Center (AWIC)

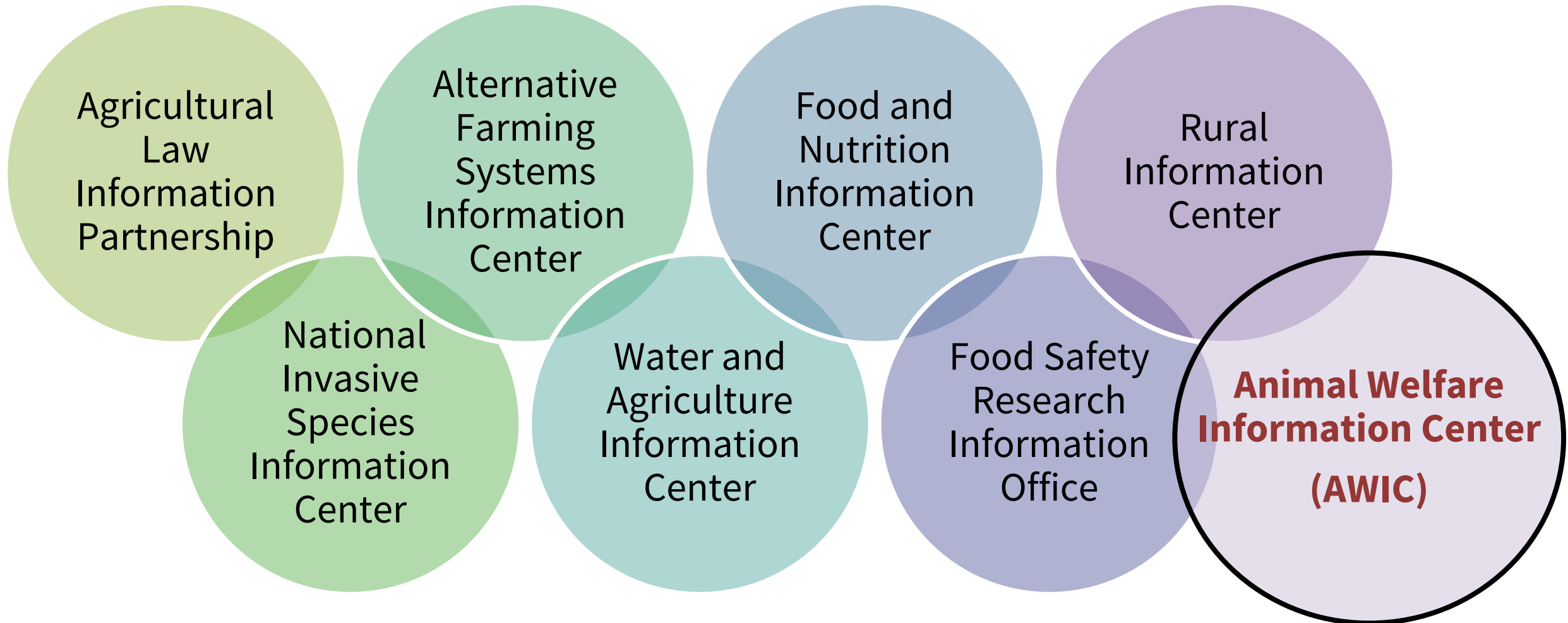




# National Agricultural Library: Our Mission

**“To facilitate the creation of agricultural knowledge through the acquisition, curation, and dissemination of the information needed to solve agricultural challenges today and in the future.”**

# NAL Information Centers



# AWA Defines Service at NAL

(7 U.S.C. 2142, Sec. 13, Subsection e)

*The Secretary shall establish an information service at the National Agricultural Library. Such service shall, in cooperation with the National Library of Medicine, provide information—*

1. pertinent to employee training;
2. which could **prevent unintended duplication** of animal experimentation as determined by the needs of the research facility; and
3. on improved methods of animal experimentation which could--
  - (a) **reduce or replace animal use**; and
  - (b) **minimize pain and distress to animals**, such as anesthetic and analgesic procedures.

# Required Contents for an Institutional Training Program

9 CFR Sec. 2.32 (c)

Employees must receive training in these 5 areas:

1. Humane animal handling and care methods.
2. Research or testing methods that limit the use of animals or minimize animal distress.
3. Proper use of anesthetics, analgesics, and tranquilizers.
4. Methods whereby deficiencies in animal care and treatment are reported.
5. Utilization of Services (e.g., **National Agricultural Library**, National Library of Medicine) to provide information regarding:
  - Appropriate methods of animal care and use.
  - Animal use alternatives in research.
  - Prevention of unnecessary duplication of animal research.
  - The intent and regulation of the Act.



# **AWIC's Products and Services**



# AWIC WEBSITE

<https://www.nal.usda.gov/programs/awic>

### Animal Welfare Information Center (AWIC)

**About AWIC**  
The Animal Welfare Information Center (AWIC) was established in 1985 as part of the U.S. Department of Agriculture's USDA National Agricultural Library (NAL) in Beltsville, Maryland. As a library service, AWIC provides information, products and services related to the improved care and use of animals in research, testing, and teaching as described in the Animal Welfare Act.

**Key Products and Services**

**Animal Welfare Act Historical Digital Collection (AWAHD)**  
The AWAHD contains publications related to the Animal Welfare Act which fall into three categories: legislative history, regulatory history, and USDA publications.

**Workshops on Meeting the Requirements of the Animal Welfare Act**  
AWIC's free virtual and in-person workshops focus on the Animal Welfare Act and its requirements, 3Rs alternatives, and

**3Rs Alternatives Literature Search Support**  
AWIC provides free alternatives literature searching services, as well as instruction and best practices for performing an alternatives literature search.

### Housing, Care and Welfare of Animals

**What is Animal Welfare?**  
Animal welfare refers to how an animal copes with its environment. To assess an animal's well-being, you must consider multiple factors such as its biological functioning (i.e. health), emotional state, and its ability to express natural behaviors. It's important to provide animals with positive welfare to support their mental and physical needs and increase their quality of life.

**Animal Welfare in Federal Regulations**  
To meet the requirements of the [Animal Welfare Act \(AWA\)](#), the regulated community (any personnel working with animals in research, teaching, and testing) must provide animals with adequate housing, nutrition, water, handling, ventilation, sanitation, and veterinary care (7 U.S.C. § 1752(a)(2)(2022)). The [Animal Welfare Information Center \(AWIC\)](#) is mandated under the AWA to provide information that helps the regulated community meet these requirements. The information below provides guidance regarding housing, care and welfare regulations for various species used in research, teaching, and testing.

**Related Topics**  
These pages provide more detailed information about animal care and welfare.



### Animal Welfare Act

The Animal Welfare Act (AWA) was signed into law on August 24, 1966. It is the only Federal law in the United States that regulates the treatment of animals in research, teaching, testing, exhibition, transport, and by dealers. The Act is enforced by [USDA, APHIS, Animal Care](#).

The AWA has been amended numerous times since its original passage in 1966. The [Animal Welfare Information Center \(AWIC\)](#) was mandated under the AWA's 1985 amendment, 'Improved Standards for Laboratory Animals Act'. Therefore, as part of AWIC's mission, we provide information on the AWA to help people understand the law and its requirements.

**Animal Welfare Act History Digital Collection (AWAHD)**  
The AWAHD contains U.S. Government publications related to the AWA that fall into three categories: legislative history, regulatory history, and USDA publications. Select the 4 resources to the right to read the original Act and some of its amendments.



[Read Other Publications in Our Collection](#)

**Animal Welfare Act Timeline**  
Not sure where to start in our digital collection? Want a quick overview of the AWA and its amendments? Take a look at our [interactive timeline](#)! It highlights the amendments to the Act over time and shares a brief summary of how the law changed with each amendment. You can also view a [static version of the timeline](#).

### 3Rs Alternatives: Technologies and Approaches

"3Rs alternatives" refers to the **Reduction, Refinement, and Replacement** of animals used in research, testing, and education. The 3Rs concept was developed over 50 years ago by two scientists, Drs. William Russell and Rex Burch. It is first described in their published book, *Principles of Humane Experimental Technique*<sup>®</sup>. Russell and Burch advocated new scientific approaches that would minimize the pain and distress of research animals via 3Rs methods.

**The 3Rs Alternatives**

- Replacement** refers to technologies or approaches that directly replace or avoid the use of animals in experiments by incorporating [non-animal methods](#) where they would otherwise have been used. Replacement can be broken down into two categories: Full/Absolute and Partial/Relative.
  - Full/Absolute Replacement: Avoids the use of any animals. Examples may include the use of human volunteers, training manikins, tissues and cells, mathematical and computer models, and established cell lines.
  - Partial/ Relative Replacement: Animals are still used to provide tissue, cells and/or organs but experiments are conducted in vitro (tissue culture, tissue slices, etc.). Partial replacement can also include the use of animals that have been slaughtered for meat or euthanized due to other purposes.

# AWIC's 3Rs in Ecotoxicity Testing Webpage

<https://www.nal.usda.gov/animal-health-and-welfare/animal-use-alternatives/3Rs-ecotoxicity-testing>

USDA National Agricultural Library  
U.S. DEPARTMENT OF AGRICULTURE

Home Topics Research Tools Collections Data Services About Us

Home / Animal Health and Welfare / Animal Use Alternatives (3Rs) / 3Rs in Ecotoxicity Testing

## 3Rs in Ecotoxicity Testing

To regulate new chemical products and pollution from industry and agriculture, government agencies mandate toxicity tests to determine how substances effect the environment. Organizations are prioritizing the development and validation of non-animal testing methods called new approach methodologies (NAMs) to conduct these toxicity tests. NAMs refers to any technology, methodology, or approach that provides information on chemical hazard, exposure, or risk assessment (e.g., "organ-on-a-chip", computer models, *in chemico* assays). On this page find links to research articles and testing tools provided by federal agencies.

### Alternatives in Ecotoxicology Literature

#### PubAg

[Environmental toxicology wars: Organ-on-a-chip for assessing the toxicity of en...](#)

[High-throughput screening paradigms in ecotoxicity testing: Emerging prospects ...](#)

[Comparative Assessment of the Sensitivity of Fish Early-Life Stage, Daphnia, an...](#)

[Exploring QSAR models for assessment of acute fish toxicity of environmental tr...](#)

See all 202 results

#### PubMed

[Environmental Toxicology Assays Using Organ-on-Chip](#)

[The role of high-throughput screening in ecotoxicology and engineered nanomater...](#)

[Endocrine Disruption and In Vitro Ecotoxicology: Recent Advances and Approaches](#)

[Using a high-throughput zebrafish embryo screening approach to support environm...](#)

See all 435 results

### New Approach Methodologies (NAMs) in Ecotoxicology

This bibliography provides citations regarding new approach methodologies (NAMs) used in the field of Ecotoxicology. NAMs are non-animal technologies and approaches used for chemical hazard, exposure and risk assessment testing such as in vitro assays, computational models, cell-based models, and organs-on-chips. The bibliography covers peer-reviewed literature published between 2010 and May 2023.

View the bibliography [pdf, 41 pages]



### Ecotoxicity Testing Tools

#### Computational Toxicology Projects

DHHS, NIEHS. National Toxicology Program Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM).

Tools and data used to predict toxicity, such as the Integrated Chemical Environment (ICE).

View the Computational Tools

#### ECOTOX Knowledgebase

U.S. Environmental Protection Agency.

A comprehensive system providing chemical environmental toxicity data on aquatic and terrestrial species.

Use ECOTOX Knowledgebase

#### SeqAPASS: Sequence alignment to predict cross-species susceptibility

U.S. Environmental Protection Agency.

An online database that allows researchers and regulators to extrapolate toxicity information across species. Requires a (free) account to access.

Access SeqAPASS (requires login)

### Featured Resources and Training

#### Alternative Methods Accepted by US Agencies

DHHS, NIEHS. National Toxicology Program Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM).

Find methods and guidance for chemical safety testing that are accepted by U.S. and international regulatory authorities as replacement, reduction, or refinement alternatives to required animal tests. These documents are recommendations that do not necessarily establish legally enforceable responsibilities.

#### TSAR - Tracking System for Alternative methods towards Regulatory acceptance

EU Reference Laboratory for alternatives to animal testing (EURL ECVAM).



# AWIC's Literature Searching Webpage

<https://www.nal.usda.gov/services/literature-searching-animal-use-alternatives>

- Step-by-step guide to searching
- Search examples
- Cheat sheets and worksheets
- Research planning and publishing guidelines
- Frequently asked questions

The screenshot shows the USDA National Agricultural Library website. The header includes the USDA logo, the text 'National Agricultural Library U.S. DEPARTMENT OF AGRICULTURE', and navigation links for 'Ask A Question', 'Contact Us', and 'DigiTop'. A search bar is present with the placeholder text 'What would you like to find?'. Below the header is a dark blue navigation bar with links for 'Home', 'Topics', 'Research Tools', 'Collections', 'Data', 'Services', and 'About Us'. The main content area has a breadcrumb trail: 'Home / Services / Literature Searching: How to Find Animal Use Alternatives'. The title of the page is 'Literature Searching: How to Find Animal Use Alternatives'. The introductory paragraph states: 'The National Agricultural Library's [Animal Welfare Information Center](#) (AWIC) provides guidance on building and conducting a 3Rs (replacement, reduction, refinement of animal use) alternatives literature search. This page details instructions for finding 3Rs alternatives along with other resources to assist individuals working with animals in research, testing, and teaching.' A section titled 'Why Consider 3Rs Alternatives?' follows, explaining that the [Animal Welfare Act](#) (AWA) requires principal investigators (PIs)/scientists to consider alternatives to procedures that may cause more than momentary or slight pain or distress to the animals. It also mentions that PIs/scientists must provide written assurance that their activities do not unnecessarily duplicate previous experiments. Below this is a section for 'Table of Contents' with links to 'Planning a Search', 'Step 1: Identify Areas to Potentially Implement Alternatives', and 'Step 2: Finding Databases and Grey Literature'. To the right of the table of contents is a section titled 'Planning a Search' which begins with the text: 'Targeted literature searching provides better results and limits irrelevant citations. Below are steps on how to conduct an alternatives literature search. You'll find guidance on creating targeted questions, selecting databases and other resources, finding keywords, understanding search syntax tools and when to use them.'

# 3Rs and Animal Species Hedges

<https://www.nal.usda.gov/services/literature-searching-animal-use-alternatives#toc-search-hedges>

- Pre-determined search strings
- Used to find information on a specific topic
- Improve discoverability of publications on animal use alternatives
- More 3Rs hedges coming in 2024



# ALTBIB Collaboration

- [ALTBIB](#) is a PubMed filter that retrieves citations on alternatives to animal testing hosted on the National Toxicology Program's website
- Created 5 new search hedges on new approach methodologies in toxicology:
  1. Acute inhalation toxicity
  2. Developmental neurotoxicity
  3. Microphysiological systems
  4. IVIVE (in-vitro-to-in-vivo-extrapolation)
  5. QSARs (quantitative structure-activity relationships)
- Subject matter experts provided gold standard articles and reviewed drafts

# Hedges Can Be Combined with Other Strings

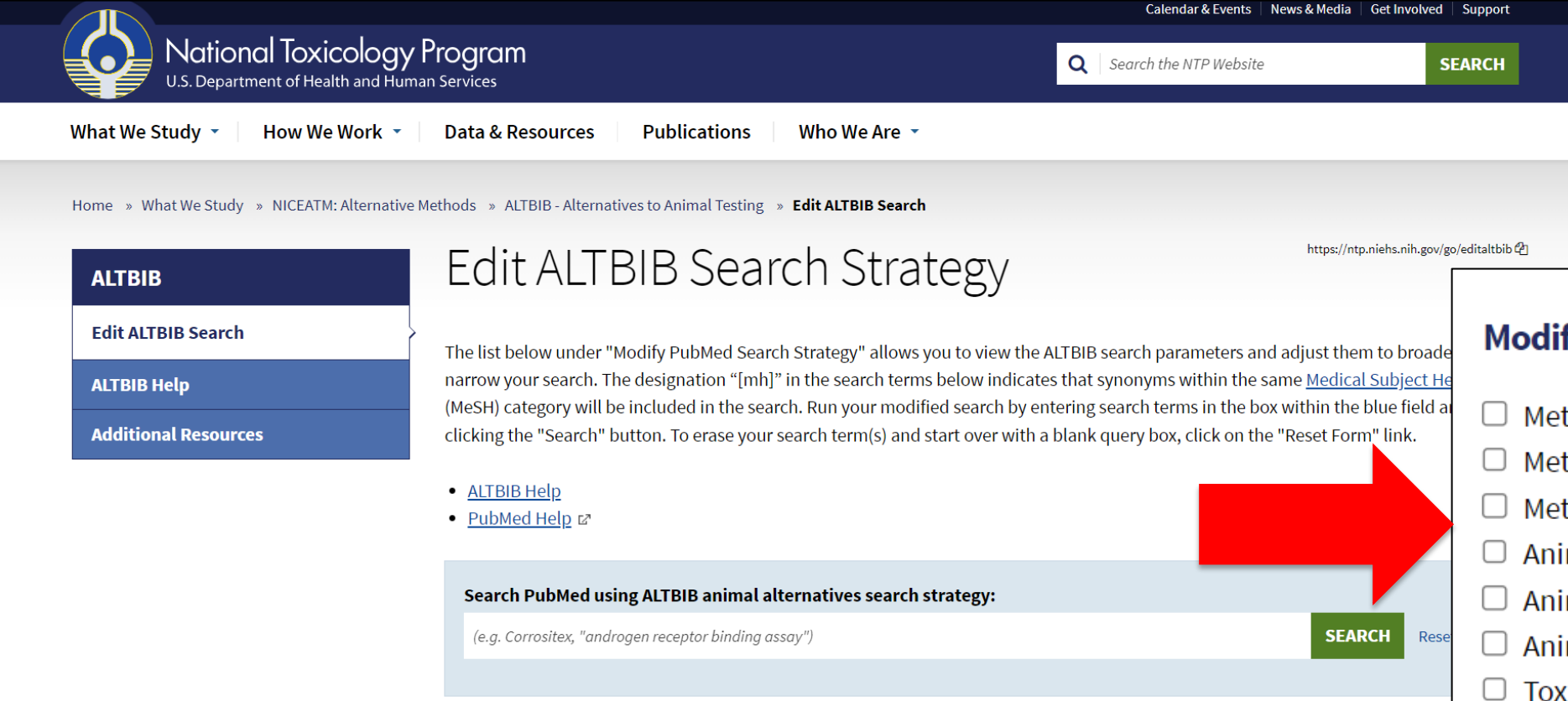
## Hedge (shortened version):

("Inhalation"[MeSH] OR "Inhalation Exposure"\*[MeSH] OR "Lung"[MeSH] OR Lung-epithelium[tiab] OR epithelial-airway[tiab] OR airway-epithelium[tiab] OR inhalation[tiab] OR air-liquid-interface[tiab] OR ALI[tiab] OR acute-inhalation-toxic\*[tiab] OR inhalation-toxic\*[tiab] OR respiratory[tiab] OR "acute-respiratory-tract-toxicity"[tiab:~2] OR bronchiole-epithelia[tiab] OR pulmonary-toxicity[tiab] OR inhalation-exposure[tiab] OR respiratory-toxic\*[tiab] OR inhalation-toxicity-test\*[tiab]) AND ("Animal Testing Alternatives"[MeSH] OR "Organoids"[MeSH] OR organoid\*[tiab] OR "Microphysiological Systems"[MeSH] OR "Lab-on-a-chip Devices"[MeSH] OR "Computer Simulation"\*[MeSH] OR "In Vitro Techniques"\*[MeSH] OR "Models, Biological"[MeSH] OR "Models, Statistical"[MeSH] OR "Quantitative Structure-Activity Relationship"[MeSH] OR "Reproducibility of Results"[MeSH] OR "organotypic"[tiab] OR ex-vivo[tiab] OR in-vitro[tiab])

## Selected Citations:

- Wang, J., Li, X., & Chen, H. (2020). Organoid models in lung regeneration and cancer. *Cancer letters*, 475, 129–135. <https://doi.org/10.1016/j.canlet.2020.01.030>
- Shrestha, J., Razavi Bazaz, S., Aboulkheyr Es, H., Yaghobian Azari, D., Thierry, B., Ebrahimi Warkiani, M., & Ghadiri, M. (2020). Lung-on-a-chip: the future of respiratory disease models and pharmacological studies. *Critical reviews in biotechnology*, 40(2), 213–230. <https://doi.org/10.1080/07388551.2019.1710458>
- Miller, A. J., & Spence, J. R. (2017). In Vitro Models to Study Human Lung Development, Disease and Homeostasis. *Physiology (Bethesda, Md.)*, 32(3), 246–260. <https://doi.org/10.1152/physiol.00041.2016>

# ALTBIB Hedges: Available Soon!



National Toxicology Program  
 U.S. Department of Health and Human Services

[Calendar & Events](#) | [News & Media](#) | [Get Involved](#) | [Support](#)

[What We Study](#) | [How We Work](#) | [Data & Resources](#) | [Publications](#) | [Who We Are](#)

[Home](#) » [What We Study](#) » [NICEATM: Alternative Methods](#) » [ALTBIB - Alternatives to Animal Testing](#) » **Edit ALTBI Search**

[ALTBI](#)  
[Edit ALTBI Search](#)  
[ALTBI Help](#)  
[Additional Resources](#)

## Edit ALTBI Search Strategy

<https://ntp.niehs.nih.gov/go/editaltbib>

The list below under "Modify PubMed Search Strategy" allows you to view the ALTBI search parameters and adjust them to broaden or narrow your search. The designation "[mh]" in the search terms below indicates that synonyms within the same [Medical Subject Headings \(MeSH\)](#) category will be included in the search. Run your modified search by entering search terms in the box within the blue field and clicking the "Search" button. To erase your search term(s) and start over with a blank query box, click on the "Reset Form" link.

- [ALTBI Help](#)
- [PubMed Help](#)

**Search PubMed using ALTBI animal alternatives search strategy:**

[Reset Form](#)

### Modify PubMed Search Strategy

- Methods/In Vitro/Cell Lines
- Methods/In Silico
- Methods/Reagents
- Animal Alternatives
- Animal Welfare
- Animals
- Toxicological Concepts
- Journals
- Other

<https://ntp.niehs.nih.gov/whatwestudy/niceatm/altbib/edit>

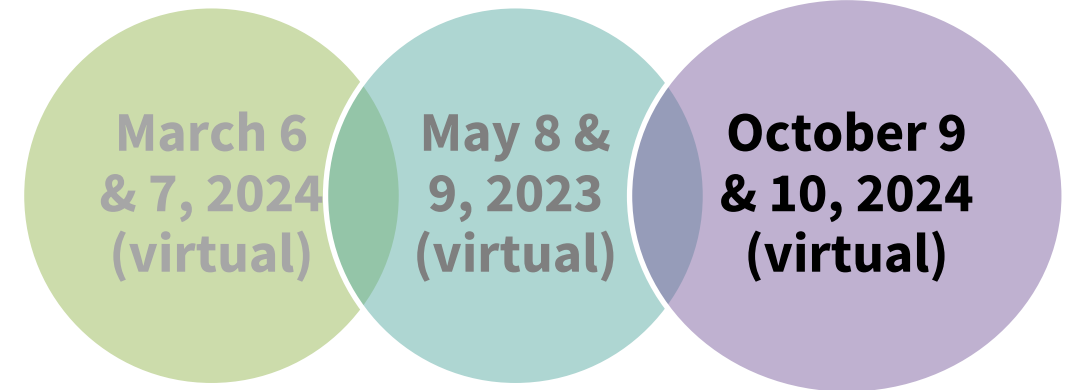
# Meeting the Requirements of the Animal Welfare Act Workshop

To register: <https://www.nal.usda.gov/about-us/events/awic-workshop>

USDA National Agricultural Library  
U.S. DEPARTMENT OF AGRICULTURE

## Animal Welfare Information Center Workshop

Learn how to find 3Rs alternatives information  
through literature searches!



The objectives of the workshop are to provide:

- An overview of the AWA and its regulations;
- An introduction to AWIC and other 3Rs organizations;
- A review of the 3Rs alternatives concept;
- Guidance for where to find 3Rs literature and resources;
- Instruction on database literature searching techniques (e.g. search syntax); and
- A demonstration of an alternatives literature search.

# AWIC's Online Workshop

To register: <https://www.nal.usda.gov/about-us/events/awic-workshop>

## Online Animal Welfare Workshop

This online version of the workshop provides an interactive environment where participants can learn about conducting literature searches, the history of animal welfare law and the specific responsibilities of researchers and IACUCs.

Combining the expertise of the AWIC staff and the flexibility of self-paced learning, the online workshop meets the needs of researchers, librarians and IACUC members nationwide.

## What You'll Cover

- A historical overview of the Animal Welfare Act (AWA), and regulations
- What is meant by the Information requirements of the Animal Welfare Act (AWA).
- 3Rs Alternatives of Reduction, Refinement, and Replacement
- Databases and resources available to access scientific literature
- A systematic approach to accessing information and creating effective literature search strategies.

Access Anytime!  
On-demand and self-paced.



# Customizable Trainings

Freely provided upon request

**Information Requirements of the AWA**

**History of the Animal Welfare Act**

**3Rs Alternatives/Resources**

**Conducting a Literature Search**

**Animal Welfare Information Center (AWIC)**



# Reference & Literature Search Assistance

---

AWIC assists patrons with animal welfare and 3Rs questions and conducts alternatives literature searches for free.

<https://www.nal.usda.gov/services/literature-searching-animal-use-alternatives>

Need assistance with a literature search? Complete a request form!

Find the form using the link above, under "additional resources".

# AWIC Newsletter



New 3Rs research



Literature searching tips



3Rs conferences/trainings




New AWIC products & services

To subscribe:

[https://public.govdelivery.com/accounts/USDAARS/subscriber/new?topic\\_id=USDAARS\\_38](https://public.govdelivery.com/accounts/USDAARS/subscriber/new?topic_id=USDAARS_38)

USDA National Agricultural Library  
 United States Department of Agriculture

## AWIC Helps You PREPARE For Better Science



Featured photo by: Gettyimages

Current concerns about reproducibility in preclinical research make it even more important to plan animal studies properly. Sometimes, finding this high-quality information can be difficult, but AWIC can help with identifying the right resources! AWIC provides information on [searching published literature](#) and resources that can assist with [experimental design](#).


Among these resources are the [PREPARE guidelines](#), created by [Norecopa](#). The PREPARE guidelines are a two-page checklist, containing essential topics that scientists should consider when planning experiments. These guidelines are useful to those looking for the latest resources on how to conduct better science, optimize animal welfare, and improve the reproducibility and translatability of animal research.

Visit the [AWIC website](#) for the latest resources on 3Rs information and technology, or [contact us](#) for additional support.

---

### Training and Conferences


**Scientists Center for Animal Welfare (SCAW)**  
 December 7, 2020 - December 8, 2020  
**Meeting the Information Requirements of the Animal Welfare Act**  
 March 24, 2021 - March 25, 2021



Stay plugged in to AWIC updates!  
**SUBSCRIBE**

USDA National Agricultural Library  
 United States Department of Agriculture

## Pets Reduce Animal Use in Research



Center for Image-Guided Animal Therapy

On International Women's Day on March 8<sup>th</sup>, the Animal Welfare Information Center is women scientists conducting research into the development and use of 3Rs


Recent experiments at the Johns Hopkins University's Center for Image-Guided make use of pets with pre-existing diseases. This method reduces the number of animals required. With the information collected, [Dr. Dara Kraltzman](#), V.M.D., Ph.D. developed imaging protocols applicable to both humans and pets. You can watch from Dr. Kraltzman and other women scientists who presented their research at 3Rs Symposium in June 2020.

About CIGAT and other reduction methods in research, visit AWIC's [7th Annual 3Rs page](#) or [contact AWIC](#).

---

### Training and Conferences

**Meeting the Information Requirements of the Animal Welfare Act**  
 March 25, 2021 (Virtual)



Stay plugged in to AWIC updates!  
**SUBSCRIBE**

## Contacting AWIC

<https://www.nal.usda.gov/programs/awic>

Tel (AWIC): (301) 504-5755

E-mail: [awic@usda.gov](mailto:awic@usda.gov)

Animal Welfare Information Center  
(AWIC)  
National Agricultural Library  
10301 Baltimore Avenue  
Beltsville, MD 20705

