

# Best Practices for Conducting a Search for Alternatives and Finding Animal Model/Model Organism Information

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**Jessie Kull, MS**

Animal Welfare Information Center (AWI)  
USDA National Agricultural Library

**Joelle Mornini, MLS**

National Institutes of Health Library





# LITERATURE SEARCHING FOR ANIMAL USE ALTERNATIVES



December 9, 2021

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Presented By:

**Jessie Kull, Animal Welfare Information Center  
Coordinator**

USDA, National Agricultural Library (NAL), Animal  
Welfare Information Center (AWIC)

# OBJECTIVES

- Brief Overview of the Animal Welfare Act
- 3Rs Alternatives
- Alternatives Literature Search Demonstration
- AWIC Products and Services



# ANIMAL WELFARE ACT

**August 24, 1966**



**Sen. Robert Dole of Kansas**

## **Food Security Act of 1985**

Subtitle F, Animal Welfare, Public Law 99-198  
Improved Standards for Laboratory Animals Act  
<https://awahistory.nal.usda.gov/search/5238128>

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“...the farm bill contains legislation dealing with the humane treatment of animals. The main thrust of the bill is to minimize pain and distress suffered by animals used for experiments and tests. In so doing, biomedical research will gain in accuracy and humanity. We owe much to laboratory animals and that debt can best be repaid by good treatment and keeping painful experiments to a minimum.”

# 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.

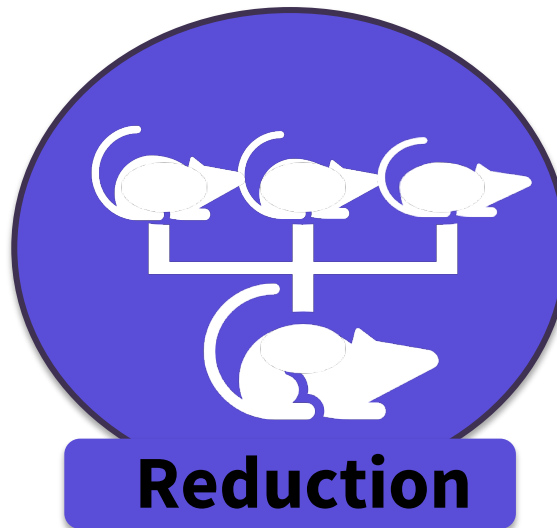
# 3Rs Alternatives



# History of the 3Rs

“The 3Rs, as first described... by Russell and Burch in 1959 in their book "[Principles of Humane Experimental Technique](#)", are regarded as new scientific methods that incorporate some aspect of **replacement**, **reduction**, or **refinement** of animal use in pursuit of the minimization of animal pain and distress consistent with the goals of the research.”

<https://caat.jhsph.edu/principles/the-principles-of-humane-experimental-technique>





# Replacement

Substituting sentient  
animals with insentient  
material

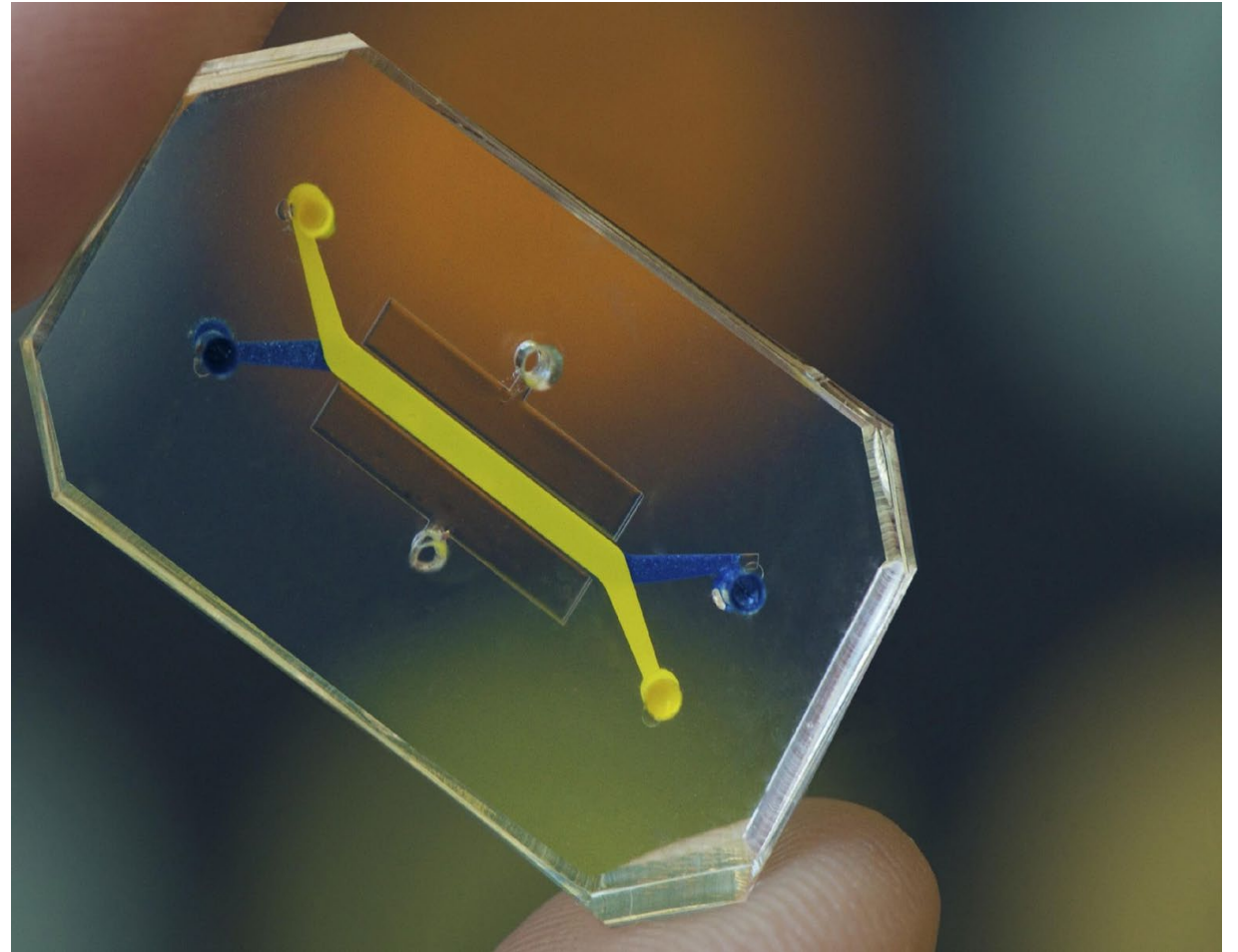


Image: [Wyss Institute](#)

# Traditional Method: Sentinel Animals

“The colony’s soiled bedding is collected and placed in the \*sentinel animal’s cage to see if the animal becomes infected with a bacteria, virus, or parasite.”

-LARC

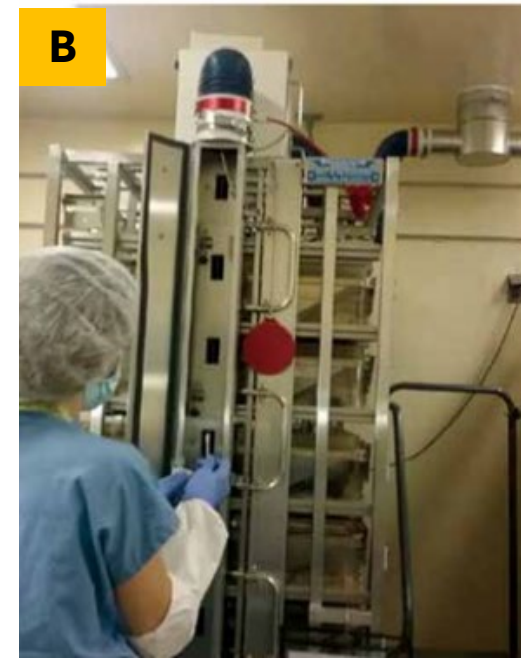
## Sentinel Monitoring Program



<https://slideplayer.com/slide/9134403/>

# Replacement Method: Environmental Health Monitoring

Methods such as exhaust air dust testing and PCR testing of filter material or swabs can replace sentinel animals to detect specific pathogens



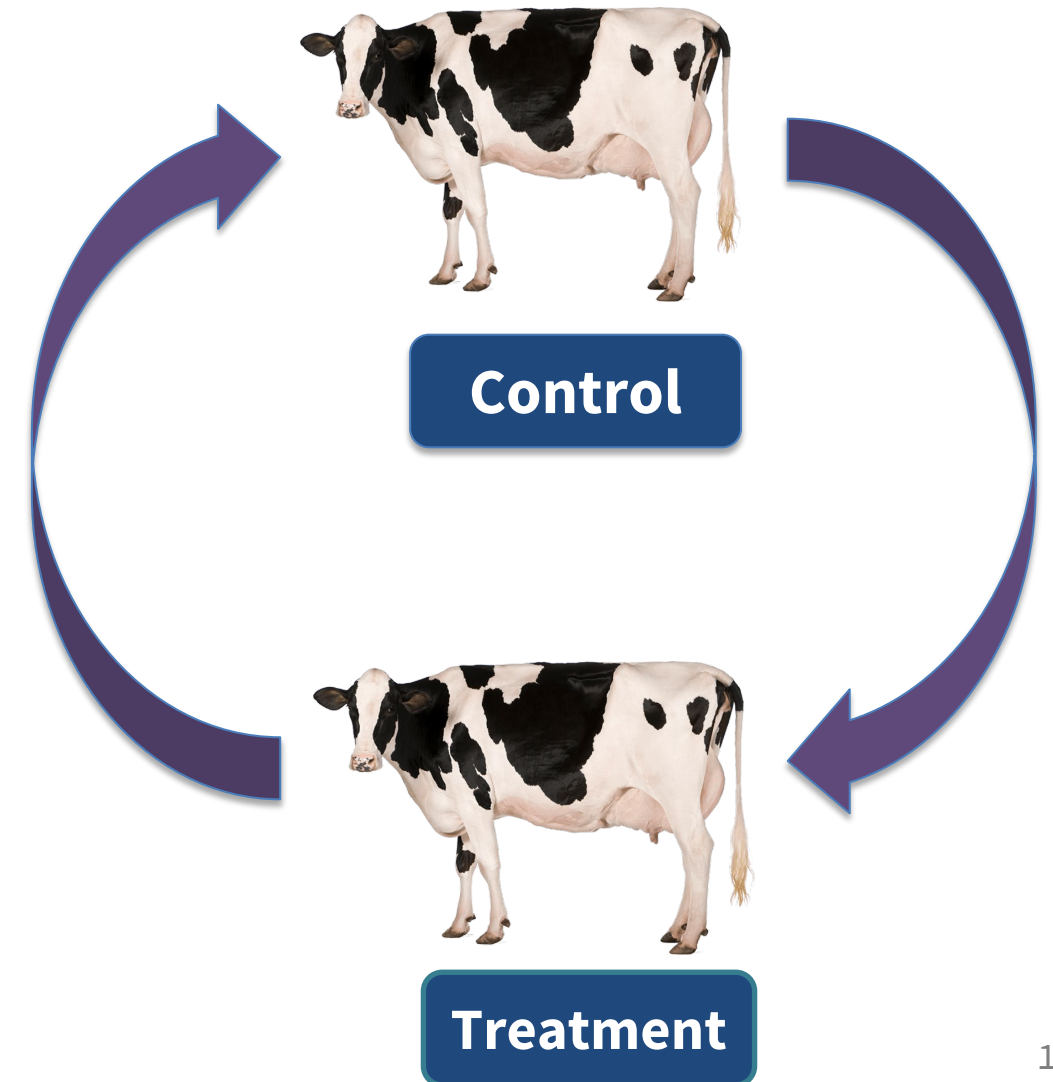
# Reduction

Reduction in the number of animals required per experiment/study while still achieving robust results



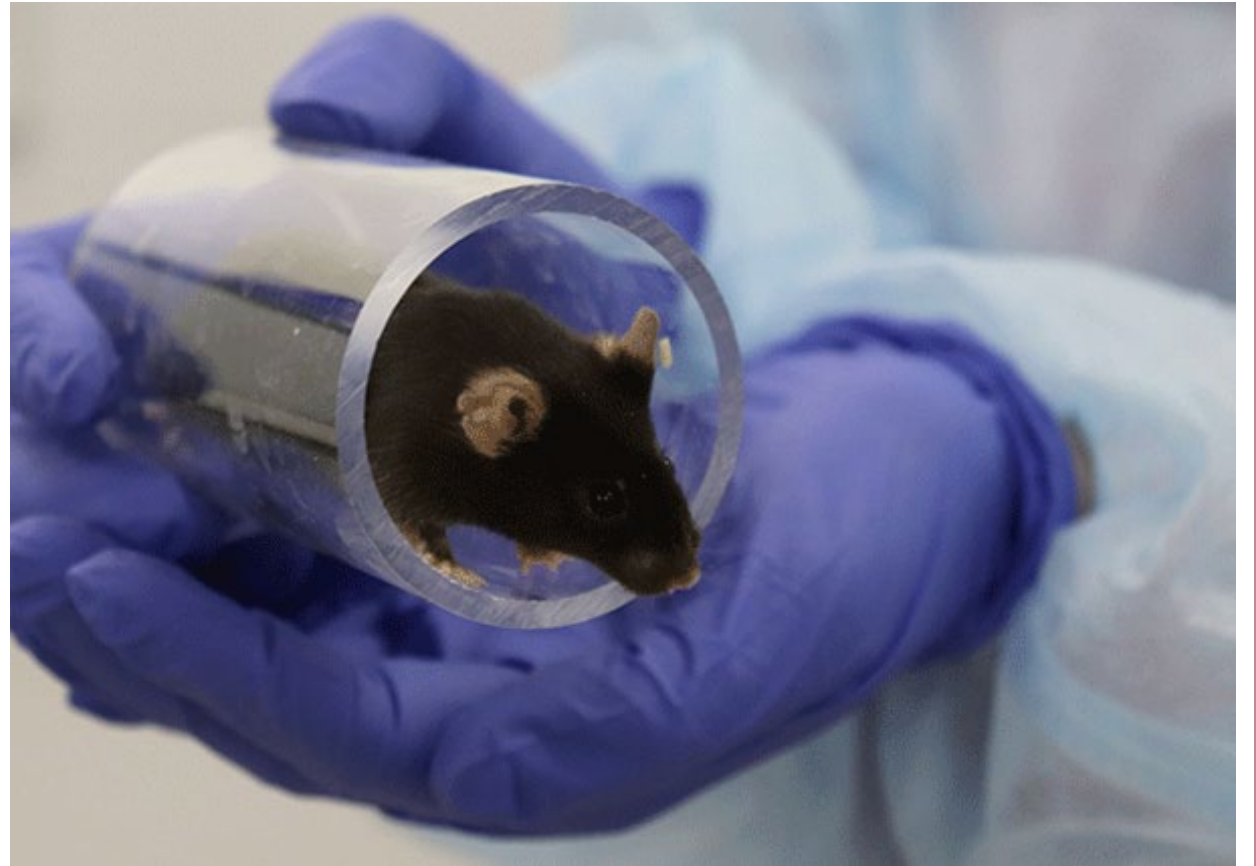
# Animals Serving as Their Own Control

- Same animal experiencing control and treatment groups = **fewer animals**
- **Reduces variability in results!**
- Example:
  - Tracked cow A's steps for 24 hours (control)
  - Tracked cow A's steps during 24-hour laying- deprivation period (treatment)



# Refinement

Methods that minimize  
animal suffering and  
improve animal welfare



# Handling & Training

*Remember: less is more*



Rat Tickling

<https://www.youtube.com/watch?v=78PfGQbL-g0>

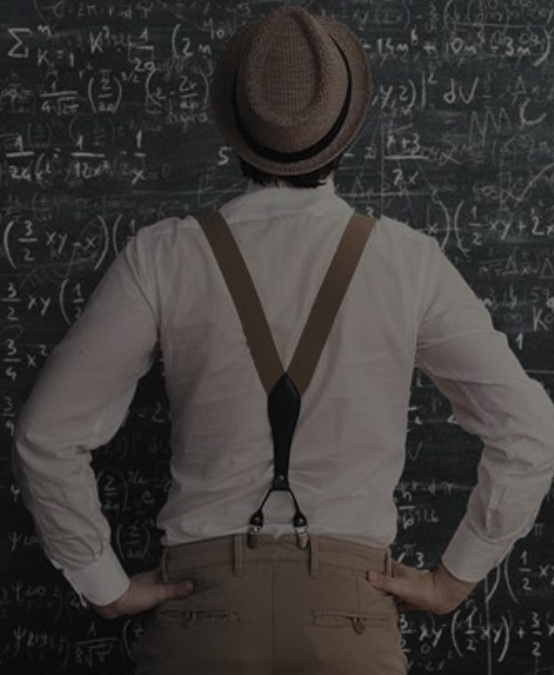


Positive Reinforcement



Mouse Tunneling

# So What's The Problem?



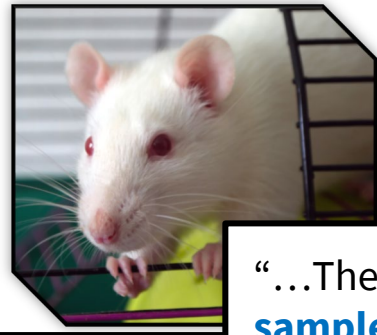


# Decreased Discoverability of 3Rs Citations



“...This is the first study to demonstrate that **pair housing improves the affective aspect of calf welfare** when compared to individual housing.”

Bučková, K., Špinka, M. & Hintze, S. Pair housing makes calves more optimistic. *Sci Rep* 9: 20246 (2019). <https://doi.org/10.1038/s41598-019-56799-w>



“...These results suggest **that nesting material enrichment provided throughout an animal’s life may reduce overgrooming-related self-injury.**”

Khoo SY, Correia V, Uhrig A. Nesting material enrichment reduces severity of overgrooming-related self-

“...These findings suggest that **testing media in pooled soiled bedding samples is more effective than traditional sentinel methods for colony health surveillance** and is a viable option when sampling at the rack level is ineffective.”

Hansel  
Method  
Science



“This article discusses recent developments **in soft-tissue surgery teaching...A silicon-based, life-like canine ovariohysterectomy model** was developed with the assistance of a model-making and special effects company.”

Gopinath D, McGreevy PD, Zuber RM, Klupiec C, Baguley J, Barrs VR. Developments in undergraduate teaching of small-animal soft-tissue surgical skills at the University of Sydney. *J Vet Med Educ*. 2012 Spring;39(1):21-9. doi: 10.3138/jvme.0411.044R. PMID: 22430078.

Need Help  
Searching  
Literature?

Contact AWC!



# Conducting a Literature Search

**SEARCH DEMONSTRATION**

## Search Example: Housing of Mice

A research lab is planning multiple studies using a strain of common laboratory white mice. They are planning to house the mice in stacked wire cages with feeders/waterers. Mice are individually housed in steel cages with no bedding or other enrichments.

**What 3Rs modifications could be made to this housing model to improve animal well-being and reduce stress?**



# Example: Identify Key Concepts/Keywords

A research lab is planning multiple studies using a strain of common laboratory white mice. They are planning to house the mice in stacked wire cages with feeders/waterers. Mice are individually housed in steel cages with no bedding or other enrichments.

Concept/Keyword Type	Search Terms/Keyword
Housing	housing
Animal	mice
3Rs Alternative	“environmental enrichment*”

# Terminology for **Refinement** Alternatives

- analgesic or analgesia or pain reduction
- anesthetic or anasthetic or anaesthetic
- **animal welfare or well-being or wellness or colony management**
- assay or technique or method or procedure
- **bedding or substrate**
- behavior or behaviour or ethology
- blood draw or blood sampling or sample sites (intravenous, tail vein, saphenous vein, etc.)
- challenge method or infection
- **environmental enrichment**
- euthanasia or humane endpoint
- grimace scales (for pain monitoring)
- handling or humane handling or humane restraint or humane treatment
- **husbandry or housing or caging**
- imaging or scanning (MRI, magnetic resonance imagery, PET scans, positron emission tomography, CAT scans, bioluminescent scanning)
- injection or injection site
- non-invasive or less-invasive
- pain or stress or distress
- positive reinforcement training or animal training
- refinement
- **social housing or group housing**
- telemetry device, monitoring device, biotelemetry

***Most search terms are obtained from the protocol and area of study.***

# Terminology for **Reduction** Alternatives

- animal model
- animal study registries
- auto control (using animal as its own control)
- biomarker or biological marker
- computational methods, computational models, in silico
- data repositories or reuse data
- experimental or statistical design (pilot study, variation, sample size, etc.)
- imaging or scanning (MRI, magnetic resonance imagery, PET scans, positron emission tomography, CAT scans, bioluminescent scanning)
- Microsampling
- monitoring device or telemetry device, biotelemetry
- pilot study
- reduce or reduction or minimize or “use fewer animals”
- reusing or sharing or repurposing animals (between studies)
- sample size or “number of animals”
- tissue banks
- variation (i.e., minimizing variation among animals in study)

# Terminology for **Replacement** Alternatives

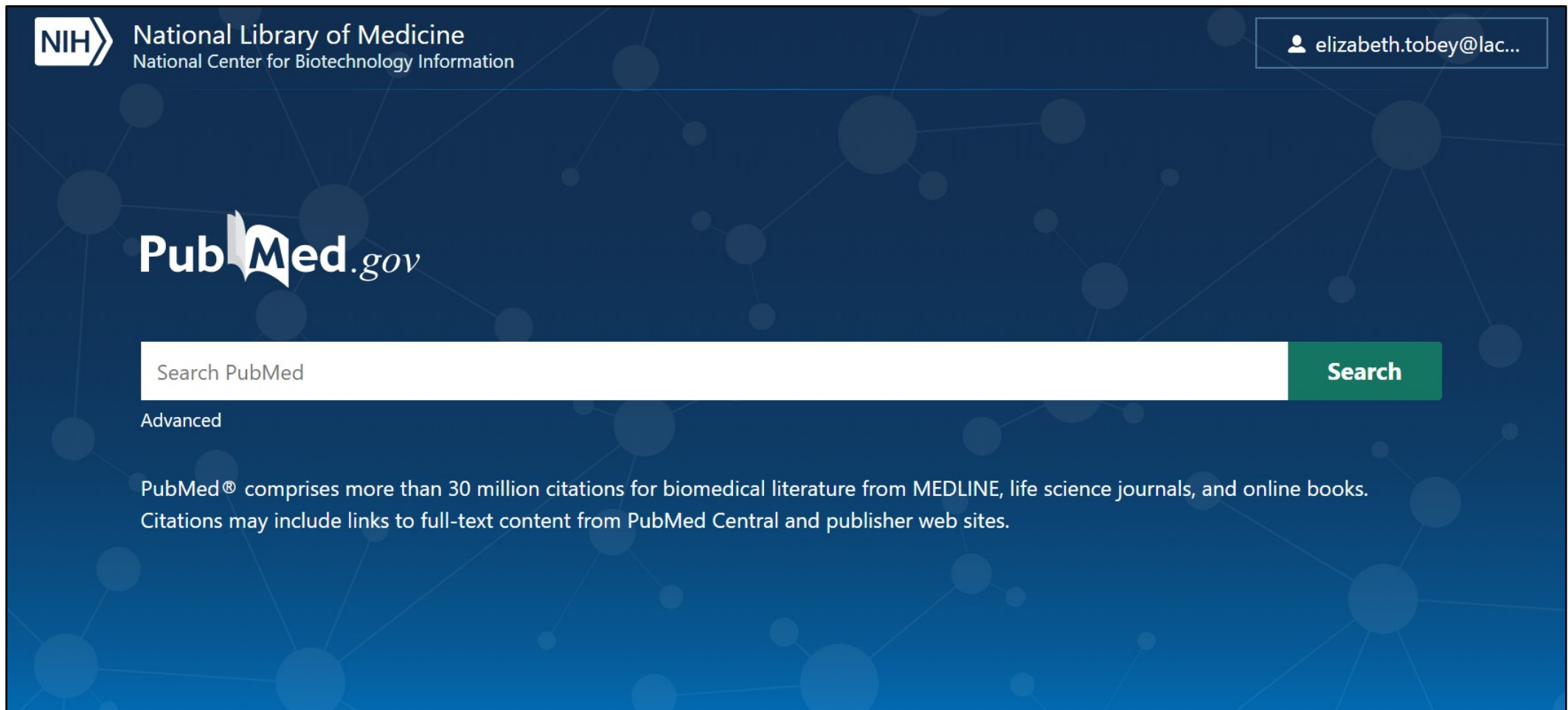
- animal testing alternative or animal use alternative or alternative (useful primarily in toxicology and education)
- cadaver or carcass
- cell culture, cell line
- computer aided instruction, computer assisted instruction
- computational methods or models (in silico)
- computer (simulation or application or model)
- digital imaging
- interactive
- in vitro
- isolated (cell, tissue, organ)
- mannequin or manikin or model (non-animal)
- mathematical (computational biology or model or simulation)
- model (animal, cadaveric, interactive, mathematical, statistical, theoretical), modeling (US spelling or modelling (UK spelling))
- non-animal model
- organ-on-a-Chip or microfluidic device
- organoids or 3-D organoids
- platinated or platination
- software
- replacement alternatives
- simulation or simulator or trainer
- structure evaluated system
- tissue culture or organ culture
- tissue engineering
- video (disc, display)
- virtual (reality)

# Combining The Search Strings

- **Housing:** **housing** OR cage OR enclosure.
- **Animal:** **mice** OR mouse OR murine OR mus.
- **3Rs:** **“environmental enrichment\*”** OR “social housing” OR toys OR “animal welfare” OR “reduce stress” OR bedding OR “nesting material\*”.



# PubMed



The screenshot shows the PubMed homepage with a dark blue background and a network diagram of nodes and lines. In the top left, the NIH logo is followed by the text "National Library of Medicine" and "National Center for Biotechnology Information". In the top right, a user profile icon is next to the email address "elizabeth.tobey@lac...". The central part of the page features the "PubMed.gov" logo. Below the logo is a search bar with the placeholder text "Search PubMed" and a green "Search" button. Underneath the search bar, the word "Advanced" is visible. At the bottom of the page, a paragraph of text reads: "PubMed® comprises more than 30 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites."

<https://pubmed.ncbi.nlm.nih.gov/>

# Evaluate and Refine the Search Based on Results

- If most of the results are relevant, the search strategy doesn't need another concept added.
- If the results are too broad, consider limits:
  - Publication year.
  - Specific fields (e.g., title, keywords, abstract).
- Fix what you can
  - Add a NOT group of things to exclude.
  - Fix any unintended truncations results.

# Document Your Search!

Maintain citation lists.

- Endnote
- Refworks
- Mendeley
- Zotero



ProQuest  
RefWorks



Clarivate  
Analytics

EndNote

# Citation that Incorporates 3Rs Alternatives

André V, Gau C, Scheideler A, Aguilar-Pimentel JA, Amarie OV, Becker L, et al. (2018) Laboratory mouse housing conditions can be improved using common environmental enrichment without compromising data. PLoS Biol 16(4): e2005019. <https://doi.org/10.1371/journal.pbio.2005019>

**From the abstract:.....“ ...nesting material and shelters may be used to improve animal welfare without impairment of experimental outcome or loss of comparability to previous data collected under barren housing conditions.”**



# Search Evaluation

## Red Flags

Only one database searched.

Terms only for painful aspects.

The term “alternative” used alone with no other 3Rs terms.

Keywords listed not relevant to protocol.

Keywords and concepts linked in an incorrect manner (e.g., wrong Boolean operators).

Search doesn't cover adequate time period (5-10 years).

# How many databases do you typically use when conducting a literature search?



# Best Databases for Animal Welfare and Alternatives Info

**AGRICOLA**

**PubMed**

**Web of  
Science**

**EMBASE**

**Scopus**

**BIOSIS**

**PsycInfo**

**CAB Direct**

**Zoological  
Record**

**Aquatic  
Sciences and  
Fisheries  
Abstracts**



A woman with curly hair is smiling while talking on a phone in a call center. Other employees are visible in the background, also working at their desks.

# AWIC: Products & Services



# National Agricultural Library Resources

## [Animal Welfare Information Center \(AWIC\)](https://www.nal.usda.gov/legacy/awic)

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



[Home](#) [Topics](#) [Publications](#) [Collections](#) [Data](#) [Services](#) [About Us](#)

Animal Welfare Information Center

[Home](#) » [Information Center](#) » [Animal Welfare Information Center](#) » Animal Welfare Information Center

[About AWIC](#) [Laws and Guidelines](#) [Training](#) [Alternatives Literature Searching](#) [3Rs Alternatives: Technologies and Approaches](#) [Housing, Care and Welfare](#) [Institutional Animal Care and Use Committees](#) [Routine Procedures](#) [Organizations](#)

## Animal Welfare Information Center

The **Animal Welfare Information Center (AWIC)** is mandated by the Animal Welfare Act (AWA) to provide information for improved animal care and use in research, testing, and teaching.

### Animal Welfare Act (AWA)

Sets standards for the treatment of animals in research, exhibition, transport, and by dealers.

## [National Agricultural Library \(NAL\)](https://www.nal.usda.gov/)

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



## National Agricultural Library

The National Agricultural Library (NAL) is one of five national libraries of the United States. It houses one of the world's largest collections devoted to agriculture and its related sciences.

### Discover Food Safety Research

The Library's Food Safety Research Information Office (FSRIO) makes it easy for you to find and track current food safety research.

[Search the Research Projects Database](#)

### Online Resources

<p><b>AGRICOLA</b></p> <p>Search citations from two agricultural science databases: indexed journal articles and the NAL catalog.</p>	<p><b>PubAg</b></p> <p>Find full-text articles and citations to peer-reviewed journal articles in the agricultural sciences.</p>	<p><b>Ag Data Commons</b></p> <p>Access open data relevant to agricultural research.</p>	<p><b>Digital Collections</b></p> <p>Explore NAL collection materials available in digital format.</p>
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# AWIC Workshops

## AWIC Workshop & Trainings

### Meeting the Requirements of the Animal Welfare Act

This in-person workshop is intended for the regulated community (any personnel working with animals in research, testing, or education) and is typically held at the National Agricultural Library (NAL) in Beltsville, Maryland. However, due to COVID-19, AWIC is offering this workshop through a virtual platform.

#### About the Workshop

The regulations require that investigators and Institutional Animal Care and Use Committees (IACUCs) demonstrate procedures that...

October  
6, 2021  
(virtual)

March 9,  
2022  
(virtual)

May 11,  
2022  
(virtual)

To Register: <https://go.usa.gov/xHFRH>



### 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!

To Register: <http://bit.ly/2ZLkAtd>

# 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

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AWIC assists patrons with searching literature and provides customizable training opportunities.

<https://bit.ly/3lofaPe>


Need Assistance?

Complete a request [form!](#)

[https://www.nal.usda.gov/legacy/sites/default/files/alt\\_lit\\_search\\_form.pdf](https://www.nal.usda.gov/legacy/sites/default/files/alt_lit_search_form.pdf)


**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.

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**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**


**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 Kraltchman](#), V.M.D., Ph.D. animal imaging protocols applicable to both humans and pets. You can watch from Dr. Kraltchman 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](#).

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**Training and Conferences**

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



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

# AWIC Newsletter



New 3Rs research



Literature searching tips



3Rs conferences/trainings



Researchers using 3Rs methods

## Contacting AWIC

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

Tel (AWIC): (301) 504-6212

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

Animal Welfare Information Center  
(AWIC)  
National Agricultural Library  
10301 Baltimore Avenue, Room 109  
Beltsville, MD 20705



# Best Practices for Finding Animal Model/Model Organism Information

Joelle Mornini, MLS  
Informationist, NIH Library  
Joelle.Mornini@nih.gov

- **After completing this training, you will be able to:**
  - Describe the difference between animal models, research organisms, and model organisms
  - Identify requirements for the NIH Model Organism Sharing Policy
  - Locate biomedical articles and patents related to animal models
  - Locate NIH-funded research projects, genetic information, and biomedical literature related to specific research organisms



# Animal Models and Model Organisms

## ■ Animal Models

- An animal with a disease either the same as or like a disease in humans
- Used to study the development and progression of diseases and to test new treatments before they are given to humans
- *Definition source: [NCI Dictionary of Cancer Terms](https://bit.ly/3I0VBad) (https://bit.ly/3I0VBad)*

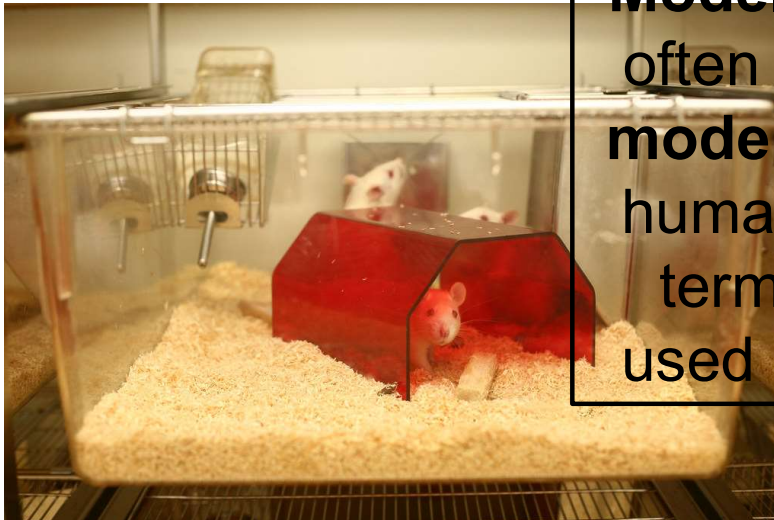
## ■ Research Organism: Any creature that scientists use to study life

## ■ Model Organism: When research organisms are used to examine elements of human disease

- Examples: Fruit fly, mouse, rat, zebrafish
- *Definition source: [Research Organisms \(NIGMS\)](https://bit.ly/3xD3VbE) (https://bit.ly/3xD3VbE)*

# Relationship of Model Organisms and Animal Models

**Model organisms** are often used as **animal models** in the study of human diseases, and terms can often be used interchangeably



**Rat (example of a model organism)**

["Rat in Research for Animal Testing"](https://www.flickr.com/photos/90500915@N05/8223128161)

(<https://www.flickr.com/photos/90500915@N05/8223128161>) by [www.understandinganimalresearch.org.uk](http://www.understandinganimalresearch.org.uk) is licensed under CC BY 2.0



**Zebrafish (example of a model organism)**

["NIH Zebrafish Facility"](https://www.flickr.com/photos/132318516@N08/27679402256)

(<https://www.flickr.com/photos/132318516@N08/27679402256>) by National Institutes of Health (NIH) is licensed under CC BY-NC 2.0

# NIH Model Organism Sharing Policy

## ***NIH Policy on Sharing of Model Organisms for Biomedical Research:*** Extension of NIH policy on sharing research resources

- Effective October 1, 2004, for applications or proposals to NIH
- Applies to extramural investigators funded by NIH grants, cooperative agreements, and contracts

All NIH applications and proposals that will produce new, genetically modified variants of model organisms expected to include a sharing plan or state why sharing is not possible

## Check [NIH Model Organism Information](https://grants.nih.gov/grants/policy/model_organism/)

([https://grants.nih.gov/grants/policy/model\\_organism/](https://grants.nih.gov/grants/policy/model_organism/)) for:

- Original NIH Guide Notice
  - [NOT-OD-04-042](https://bit.ly/3loOc4G) (<https://bit.ly/3loOc4G>)
- FAQ on sharing of model organisms
- Example plans (simple plan, complex plan, and plan for sharing mice)



[Brochure on the NIH Model Organism Sharing Policy \(PDF\)](https://bit.ly/3pdkve8)  
(<https://bit.ly/3pdkve8>)

# Finding Biomedical Articles on Animal Models

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# Finding Biomedical Articles: PubMed & MeSH

- **PubMed®** (<https://pubmed.ncbi.nlm.nih.gov/>) is a free biomedical literature database from the National Library of Medicine
  - Use controlled vocabulary for PubMed, the **Medical Subject Headings** (MeSH terms), to search for articles with MeSH “[Models, Animal](#)” (<https://bit.ly/3o5eGQw>)

## All MeSH Categories

[Analytical, Diagnostic and Therapeutic Techniques and Equipment Category](#)

[Investigative Techniques](#)

**Models, Animal**

[Disease Models, Animal](#)

[Arthritis, Experimental](#)

[Diabetes Mellitus, Experimental](#)

[Liver Cirrhosis, Experimental](#)

[Neoplasms, Experimental +](#)

[Nervous System Autoimmune Disease, Experimental +](#)

[Radiation Injuries, Experimental](#)

[Isolated Heart Preparation](#)

**When searching PubMed using MeSH, all narrower MeSH terms under a broader term (like Models, Animal) are also automatically included in the search**



# Finding Biomedical Articles: PubMed

The screenshot shows the PubMed.gov search interface. At the top left is the NIH logo and the text "National Library of Medicine National Center for Biotechnology Information". A "Log in" button is in the top right. The search bar contains the query "Models, Animal"[Mesh] AND melanoma, which is highlighted with a red box. Below the search bar are links for "Advanced", "Create alert", and "Create RSS", and a "Search" button. A "User Guide" link is also present. Below the search bar are buttons for "Save", "Email", and "Send to", and a "Sorted by: Best match" dropdown menu. A "Display options" button is also visible. On the left side, there is a "MY NCBI FILTERS" section and a "RESULTS BY YEAR" bar chart showing an increasing trend from 1949 to 2021. The main results area shows 15,699 results. The first result is a citation for a paper titled "Transplantable Melanomas in Hamsters and Gerbils as Models for Human Melanoma. Sensitization in Melanoma Radiotherapy-From Animal Models to Clinical Trials." by Śniegocka M, Podgórska E, Płonka PM, etc. The citation includes the journal name, date, volume, issue, page number, and DOI. It also indicates that the article is available for free on PubMed Central (PMCID: 29614755) and is a review. The abstract text is partially visible, mentioning in vitro studies on melanogenesis inhibition and radio-chelation therapy.

# Finding Patents on Animal Models

# Finding Patents on Espacenet: CPC

- [Espacenet](https://worldwide.espacenet.com/) (<https://worldwide.espacenet.com/>), a free patent search tool from the European Patent Office
- Use the **Cooperative Patent Classification (CPC)** browser to find classifications related to animal models and model organisms
  - **Example:** [A01K2267/03](https://bit.ly/3D3sy20) (<https://bit.ly/3D3sy20>) - Animal model, e.g. for test or diseases

The screenshot shows the Espacenet CPC browser interface. At the top, there are tabs for 'My Espacenet', 'Help', 'Classification search', and 'Results'. The 'Classification search' tab is active. Below the tabs, there is a search bar with the text 'animal model' and a 'Search' button. To the right of the search bar is an 'Index' with letters A through Y. Below the search bar, there are navigation icons and a 'CPC' button. A table of classification symbols and titles is displayed. The table has two columns: 'Classification symbol' and 'Title and description'. The first row is 'A01K 67/00 Rearing or breeding animals, not otherwise provided for; New breeds of animals'. The second row is 'A01K 2267/00 An'. Below this, several sub-classes are listed with checkboxes: 'A01K 2267/01', 'A01K 2267/02', 'A01K 2267/025', 'A01K 2267/03', 'A01K 2267/0306', and 'A01K 2267/0312'. A blue box with a circled '2' highlights the 'A01K 2267/03' row. To the right of the table, there is a 'Selected classifications' section with a list of 'A01K2267/03/low' and a circled '3' next to it. Below this is a 'Clear' button and a 'Find patents' button. At the bottom right, the number '51' is displayed.

(1) Keyword search for classification, (2) choose the checkbox by relevant classification (will automatically select all subclasses), and (3) choose to search classification in Espacenet

# Finding Patents on Espacenet: Advanced Search

The screenshot displays the Espacenet patent search interface. At the top, the search query is entered as "cpc = "A01K2267/03/low" AND ta any "mice mouse" AND ta = "hepatitis"". The "Advanced search" toggle is highlighted with a red box. Below the search bar, the "Advanced search" section is also highlighted with a red box, showing three search criteria: "CPC" set to "A01K2267/03/low", "Title or abstract" set to "any" with the keyword "mice mouse", and "Title or abstract" set to "=" with the keyword "hepatitis". The search results show "18 results found" and a list of results, with the first result being "1. Transgenic mouse hepatitis C virus model comprising a he...". A blue callout box with white text is overlaid on the right side of the results, providing instructions on using the advanced search.

**Also try using the Advanced Search on Espacenet to search for keyword in title/abstract/claims (like organism name or disease) in combination with CPC codes (like A01K2267/03)**

# Finding NIH-Funded Projects Related to Research Organisms

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# Finding NIH-Funded Projects: NIH RePORTER

- Use [NIH RePORTER](https://reporter.nih.gov/) (<https://reporter.nih.gov/>) to find NIH-funded research projects, investigators, publications, and patents
- **Tips for locating projects that utilized specific research organisms:**
  - Under [Advanced Projects Search](https://reporter.nih.gov/advanced-search) (<https://reporter.nih.gov/advanced-search>), choose Advanced text search
  - Enter all versions of the organism name (both common and scientific, as well as plural versions)
  - Use Boolean operators (AND/OR/NOT), quotes for phrases, and parentheses to group concepts
  - Example search: ***(fruit fly or fruit flies or Drosophila melanogaster or "D. melanogaster") and cancer***
  - Try limiting text search to Project Title/Project Terms/Project Abstracts

### Text Search

Text Search (Logic) ?

AND ?

OR ?

Advanced ?

(fruit fly or fruit flies or Drosophila melanogaster or "D. melanogaster") and cancer

2,413 characters left

Limit Project search to

Project Title

Project Terms

Project Abstracts

# Viewing Search Results on NIH RePORTER

The screenshot shows the NIH RePORTER search results page. At the top, there are navigation tabs: **Projects** (highlighted with a red box), **Publications**, **Patents**, **Clinical Studies**, and **News & More**. Below the tabs is a sidebar with icons for **List**, **Charts**, and **Map**. The **List** icon is highlighted with a blue box. Below the sidebar are filter options: **Active Projects** (checkbox), **Fiscal Years**, **Org Names**, **Agencies**, **States**, **Countries**, and **Principal Investigators**. The main content area displays a table of search results with columns: **T Act Project**, **Year**, **Sub**, **Principal Investigator(s)/ Project Leader(s)**, and **Organization**. The table contains three rows of results:

T Act Project	Year	Sub	Principal Investigator(s)/ Project Leader(s)	Organization
<a href="#">1 R01 GM137430 - 01A1</a>			<a href="#">SCHMIDT, PAUL</a> <a href="#">MCINTYRE, LAUREN M.</a>	UNIVERSITY OF PENNSYLVANIA
<a href="#">5 R35 GM119557 - 05</a>			<a href="#">TENNESSEN, JASON MICHAEL</a>	INDIANA UNIVERSITY BLOOMINGTON
<a href="#">5 F32 GM129931 - 02</a>			<a href="#">BALDWIN-BROWN, JAMES GUY</a>	UNIVERSITY OF UTAH

A callout box with a black border and white background contains the text: **View lists of publications, patents, and clinical trials related to NIH-funded project results**. The callout box is positioned over the bottom right of the table.

# Finding Genetic Information



# Using Taxonomy Browser

- Use the [Taxonomy Browser](https://www.ncbi.nlm.nih.gov/taxonomy) (<https://www.ncbi.nlm.nih.gov/taxonomy>) from the National Center for Biotechnology Information (NCBI, part of the National Library of Medicine) to find links to genetic information and biomedical literature related to specific research organisms
- Search by common or scientific name

The image shows a sequence of steps to access the NCBI Taxonomy Browser. It starts with a search box where 'zebrafish' is entered. An arrow points to a box containing the search results: 'Danio rerio (zebrafish), species, bony fishes' with links for 'Nucleotide' and 'Protein'. A second arrow points to the full Taxonomy Browser page for 'Danio rerio'. The page includes a search bar, navigation tabs (Entrez, PubMed, Nucleotide, Protein, Genome, Structure, PMC, Taxonomy, BioCollections), and a detailed information section for 'Danio rerio' (Taxonomy ID: 7955). The information section lists the current name, basionym, homotypic synonym, Genbank common name, NCBI BLAST name, Rank, Genetic code, Mitochondrial genetic code, and Other names. A table on the right side of the page, titled 'Entrez records', provides direct links to various databases and the number of records for each.

Entrez records	
Database name	Direct links
Nucleotide	1,894,414
Protein	88,631
Structure	434
Genome	1
Popset	131
GEO Datasets	28,769
PubMed Central	18,368
Gene	100,231
HomoloGene	14,559
SRA Experiments	89,662
GEO Profiles	328,737
Protein Clusters	1
Identical Protein Groups	60,854
Bio Project	1,913

# Using Taxonomy Browser: NCBI Database Links

Pages for specific organisms on Taxonomy Browser list direct links to other NCBI databases, such as:

- **Nucleotide** (genome, gene, and transcript sequence data)
- **Protein** (protein sequences)
- **Genome** (information on genomes including sequences, maps, chromosomes, assemblies, and annotations)
- **PubMed Central** (full-text biomedical articles)

Entrez records	
Database name	Direct links
Nucleotide	<a href="#">1,894,414</a>
Protein	<a href="#">88,631</a>
Structure	<a href="#">434</a>
Genome	<a href="#">1</a>
Popset	<a href="#">131</a>
GEO Datasets	<a href="#">28,769</a>
PubMed Central	<a href="#">18,368</a>
Gene	<a href="#">100,231</a>
HomoloGene	<a href="#">14,559</a>
SRA Experiments	<a href="#">89,662</a>
GEO Profiles	<a href="#">328,737</a>
Protein Clusters	<a href="#">1</a>
Identical Protein Groups	<a href="#">60,854</a>
Bio Project	<a href="#">1,913</a>

Links to other NCBI databases for [Danio rerio \(zebrafish\)](#) (<https://bit.ly/3d1dRSM>)

# Using Taxonomy Browser: External Links

Pages for specific organisms on Taxonomy Browser also list links to external information resources, such as model organism databases

Links to external information resources for [Danio rerio \(zebrafish\)](https://bit.ly/3d1dRSM) (<https://bit.ly/3d1dRSM>)

LinkOut	Subject	LinkOut Provider
<a href="#">DNA barcoding : <i>Danio rerio</i></a>	taxonomy/phylogenetic	<a href="#">Barcodes of Life</a>
<a href="#">32 records from this provider</a>	supplemental materials	<a href="#">Dryad Digital Repository</a>
<a href="#">4 records from this provider</a>	organism-specific	<a href="#">Genomes On Line Database</a>
<a href="#">Show Biotic Interactions</a>	taxonomy/phylogenetic	<a href="#">Global Biotic Interactions</a>
<a href="#">Related Immune Epitope Information</a>	gene/protein/disease-specific	<a href="#">Immune Epitope Database and Analysis Resource</a>
<a href="#">639469800: <i>Danio rerio</i> Tuebingen</a>	organism-specific	<a href="#">Integrated Microbial Genomes</a>
<a href="#">Danio rerio (Hamilton, 1822)</a>	taxonomy/phylogenetic	<a href="#">Integrated Taxonomic Information System</a>
<a href="#">Danio rerio</a>	taxonomy/phylogenetic	<a href="#">Lifemap</a>
<a href="#">Zebrafish Model Organism Database</a>	taxonomy/phylogenetic	<a href="#">NCBI taxonomy bookmarks</a>
<a href="#">OMA</a>	taxonomy/phylogenetic	<a href="#">OMA Browser: Orthologous MAtrix</a>



## Tips for locating model organism databases:

- Check the External Information Resources for organism pages on [Taxonomy Browser](https://www.ncbi.nlm.nih.gov/taxonomy) (<https://www.ncbi.nlm.nih.gov/taxonomy>)
- Check the **Online Bioinformatics Resources Collection (OBRC)** by the Health Sciences Library System at the University of Pittsburgh (note that some links may be outdated):
  - [Non-human vertebrates model organisms genomic databases](https://bit.ly/3o1BPU4) (<https://bit.ly/3o1BPU4>)
  - [Non-vertebrates model organisms genomic databases](https://bit.ly/2ZxY76r) (<https://bit.ly/2ZxY76r>)

- Model organisms are often used as animal models in the study of human diseases
- Be aware of NIH Model Organism Sharing Policy
- Find information on animal models and model organisms through:
  - PubMed (biomedical articles)
  - Espacenet (patent information)
  - NIH RePORTER (NIH-funded research projects)
  - Taxonomy Browser (links to genetic information and biomedical literature)
  - Model organism databases (genetic information)

# Questions?

- Joelle Mornini, Informationist
- Office: 301-451-9333
- Email: [joelle.mornini@nih.gov](mailto:joelle.mornini@nih.gov)



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# Questions?



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Next OLAW Online Seminar:  
TBD March 2022



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