

Meeting the Information Requirements of the Animal Welfare Act

Presented by
Animal Welfare Information Center (AWIC)
National Agricultural Library
U.S. Department of Agriculture



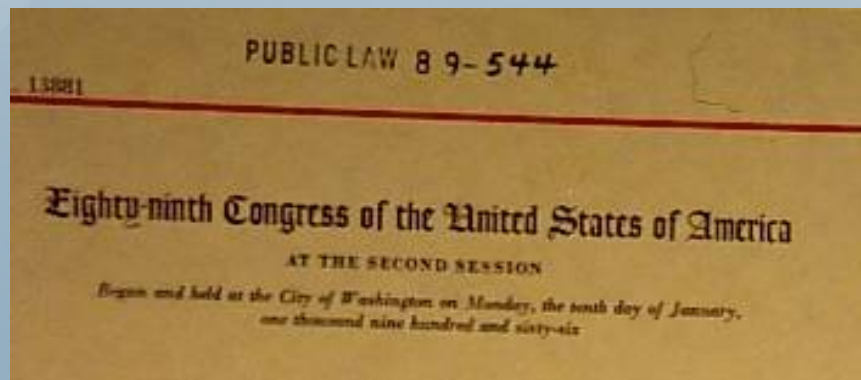


Objectives

- **List the information requirements of the Animal Welfare Act.**
- **Define the 3 Rs of Alternatives.**
- **Become familiar with databases and other resources helpful in searching for alternatives.**
- **Design and run a search for alternatives.**



Animal Welfare Legislation: Animal Welfare Act, Regulations and Other Policies





Early History of Animal Protection Legislation in the U.S.

1641	Puritan's Body of Liberties
1828	First state anti-cruelty law passed in New York
1873	First Federal legislation: "28-Hour Law"
1958	Humane Methods of Slaughter Act passed
1965	Disappearance of Pepper and publication of <i>Sports Illustrated</i> article
1966	<i>Life</i> article published: "Concentration Camp for Dogs"

Early History of Animal Protection Legislation in the U.S.

LIFE

Vol. 45, No. 5 Feb. 4, 1954

The dog's name is Lucky. He is a lemon-colored English pointer with a fine head and subtle signs of good, expensive breeding. But when a woman from the Animal Rescue Institute came across Lucky at a Salford, Ohio, fair three weeks ago, this is what she saw—a pathetic, emaciated horror, cowering, hopeless and up for auction. The woman bought him for \$3 plus a dollar for the chain.

Lucky has his counterparts all over the U.S. Unscrupulous dog "dealers," taking advantage of the growing demand for dogs for vital medical research, are running a lucrative and unscrupulous business. Laboratories now need almost two million dogs a year. To cash in on this need, the dealers rave the country paying a buck or two to anyone who comes forward with a dog, and no questions asked. Family pets, trained to obedience and easy to handle, are especially prized, and the Humane Society of the U.S. estimates that 50 percent of all missing pets have been stolen by "dogsnappers," who in turn sell them to the dealers. Some dealers keep big inventories of dogs in unspeakably filthy compounds that seem scarcely less appalling than the concentration camps of World War II. Many do not sell directly to labs but simply dispose of their packs at auction where the going rate is 30¢ a pound. Puppies, often dumped in their own wombs, sell for 10¢ apiece. Stirred by revelations to a House subcommittee of such outrages and prodded by the continuing raids on these camps by humane societies, Congress already has eight bills pending, any of which would outlaw these shameful conditions.

Pets for sale cheap—no questions asked

CONCENTRATION CAMPS FOR DOGS

Photographed by STAN WAYMAN





History of Animal Protection Legislation in the U.S.

- **Laboratory Animal Welfare Act of August 24, 1966**
- **Animal Welfare Act Amendments**

1970	1990
1976	2002
1985	



President Johnson after signing the Laboratory Animal Welfare Act, 1966
Senator Magnuson, Representative Poage, Representative Horton, Senator Clark



Laboratory Animal Welfare Act of 1966

Public Law 89-544

- **Authorizes Secretary of Agriculture to regulate transport, sale, and handling of animals pre-research or “for other purposes.”**
- **Defines animal as dogs, cats, nonhuman primates, guinea pigs, hamsters, and rabbits.**
- **Establishes licensing of dog and cat dealers.**



Animal Welfare Act of 1970

Public Law 91-579

- Ensures humane treatment of animals for research or exhibition by regulating their transport, sale, housing, care, handling, and treatment in commerce, exhibition, and all stages of experimentation.
- Clarifies definition of animal as all warm-blooded vertebrates *excluding*
 - horses not used in research and
 - farm animals used for improving animal nutrition, breeding, management, production efficiency, and the quality of food and fiber.



Animal Welfare Act of 1970

Public Law 91-579

- Defines *regulated* and *non-regulated* institutions:
 - **Regulated**: research facilities, dealers, and exhibitors.
 - **Non-regulated**: retail pet stores, state and county fairs, rodeos, purebred dog and cat shows, and agricultural exhibitions.



Animal Welfare Act of 1976

Public Law 94-279

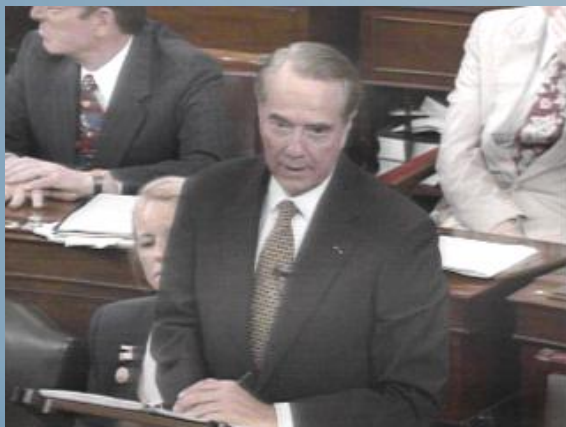
- **Refines regulations on transport and commerce.**
- **Requires health certification prior to transport and commerce.**
- **Discusses licenses, methods of payments, penalties.**
- **Outlaws interstate or foreign transport of animals used in fighting ventures.**



Food Security Act of 1985

Subtitle F, Animal Welfare, Public Law 99-198
Improved Standards for Laboratory Animals Act

“...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.”



Sen. R. Dole
Congressional Record
House of Representatives
17 December 1985



Food Security Act of 1985

Subtitle F, Animal Welfare, Public Law 99-198

Improved Standards for Laboratory Animals Act

- Clarifies humane care to include specific criteria such as sanitation, ventilation, and housing.
- Directs the Secretary of Agriculture to establish regulations for
 - exercise for dogs and
 - a physical environment adequate to promote the psychological well-being of primates.
- Specifies that animal pain and distress must be minimized (veterinary care, anesthesia, analgesia, tranquilizers, and euthanasia).



Food Security Act of 1985

Subtitle F, Animal Welfare, Public Law 99-198
Improved Standards for Laboratory Animals Act

- **Specifies that principal investigators must consider alternatives to any procedure likely to cause pain or distress.**
- **Establishes the Institutional Animal Care and Use Committee (IACUC).**
- **Explains penalties for the release of trade secrets.**
- **Establishes an information service at the National Agricultural Library.**



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.**



Food, Agriculture, Conservation, and Trade Act of 1990 (*Pet Theft Act of 1990*)

Public Law 101-624

- **Establishes a five-day holding period requirement for dogs and cats at shelters and other holding facilities.**
- **Requires dealers provide written certification about each animal's background to recipients.**
- **Describes mechanisms of enforcement, injunctions, and penalties for violations.**



Farm Security and Rural Investment Act of 2002 (*Farm Bill*) Public Law 107-101

- **Modifies the definition of animals to exclude rats, mice and birds bred for use in research.**
- **Makes it illegal to knowingly sponsor or exhibit an animal in a fighting venture, if any animal was moved in interstate or foreign commerce and increases fines.**



Code of Federal Regulations

Title 9, Chapter I, Subchapter A, Animal Welfare

- Specifies how to comply with the Animal Welfare Act and its amendments.
 - **Definitions:** “Animal” excludes *Rattus*, *Mus*, and birds bred and raised for use in research.
 - **Regulations:** Specific requirements for facility licensing, veterinary care, records, stolen animals.
 - **Standards:** Facilities and operations, health and husbandry, transportation.
 - **Rules of Practice:** Scope, application, administrative procedures.

Code of Federal Regulations

Title 9, Chapter I, Subchapter A, Animal Welfare

Painful Procedure, Sec. 1.1

...as applied to any animal means any procedure that would reasonably be expected to cause more than slight or momentary pain or distress in a human being to which that procedure was applied, that is pain in excess of that caused by injections or other minor procedures.





Information Requirements of the AWA 9 CFR 2.31 (d)

[The] IACUC shall determine that...

- (ii) The principal investigator has considered alternatives to procedures that may cause more than momentary or slight pain or distress to the animals, and has provided a written narrative description of the methods and sources, e.g., the Animal Welfare Information Center, used to determine that alternatives were not available;**

- (iii) The principal investigator has provided written assurance that the activities do not unnecessarily duplicate previous experiments.**



Information Requirements of the AWA 9 CFR 2.31 (d)

[The] IACUC shall determine that...

(iv) Procedures that may cause more than momentary or slight pain or distress to the animals will:

(A) Be performed with appropriate sedatives, analgesics or anesthetics, unless withholding such agents is justified for scientific reason, in writing, by the principal investigator and will continue for only the necessary period;



Information Requirements of the AWA 9 CFR 2.31 (d)

[The] IACUC shall determine that...

- (x) No animal will be used in more than one major operative procedure from which it is allowed to recover unless:**
 - (A) Justified for scientific reasons by the principal investigator in writing.**
 - (B) Required as routine veterinary procedure.**
 - (C) Approved by the Administrator of APHIS.**



Final Rules and Regulations

Federal Register, Vol. 54 (168), August 31, 1989

“The principal investigator must provide a written narrative of the sources, such as biological abstracts, Index Medicus, the Current Research Information Service (CRIS), and the Animal Welfare Information Center that is operated by the National Agricultural Library. We believe that in fulfilling this requirement Committee members will discuss these efforts with the principal investigator in reviewing the proposed activity. We also believe that considerations of alternatives will be discussed during Committee meetings where proposed activities are presented for approval, and made part of the meeting minutes...”



Animal Care Policy #12

Written Narrative for Alternatives to Painful/Distressful Procedures: June 21, 2000

- **“..the performance of a database search remains the most effective and efficient method for demonstrating compliance with the requirement to consider alternatives to painful/distressful procedures.”**
- **The database search narrative must, at a minimum, include**
 - **Names of the databases searched**
 - **Date the search was performed**
 - **Period covered by the search**
 - **Key words and/or the search strategy used.**

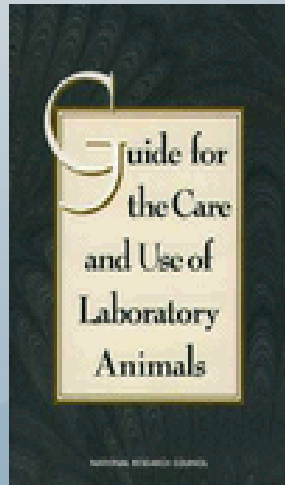
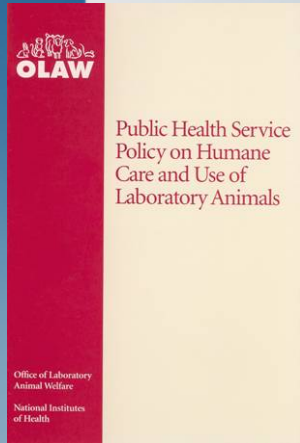


Animal Care Policy #12

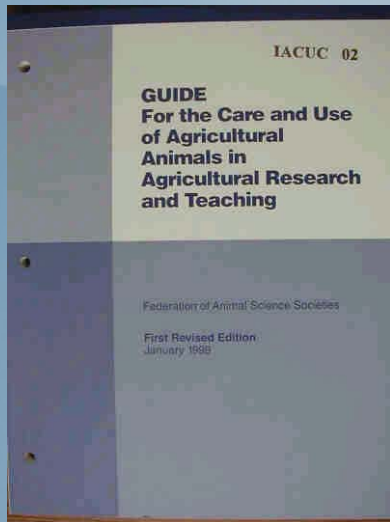
Written Narrative for Alternatives to Painful/Distressful Procedures: June 21, 2000

Alternatives should be considered in the planning phase of the animal use proposal. When a proposal is modified during its performance, significant changes are subject to prior review by the IACUC, including the review of the implications of those changes concerning the availability of alternatives.

Other Policies and Guidelines



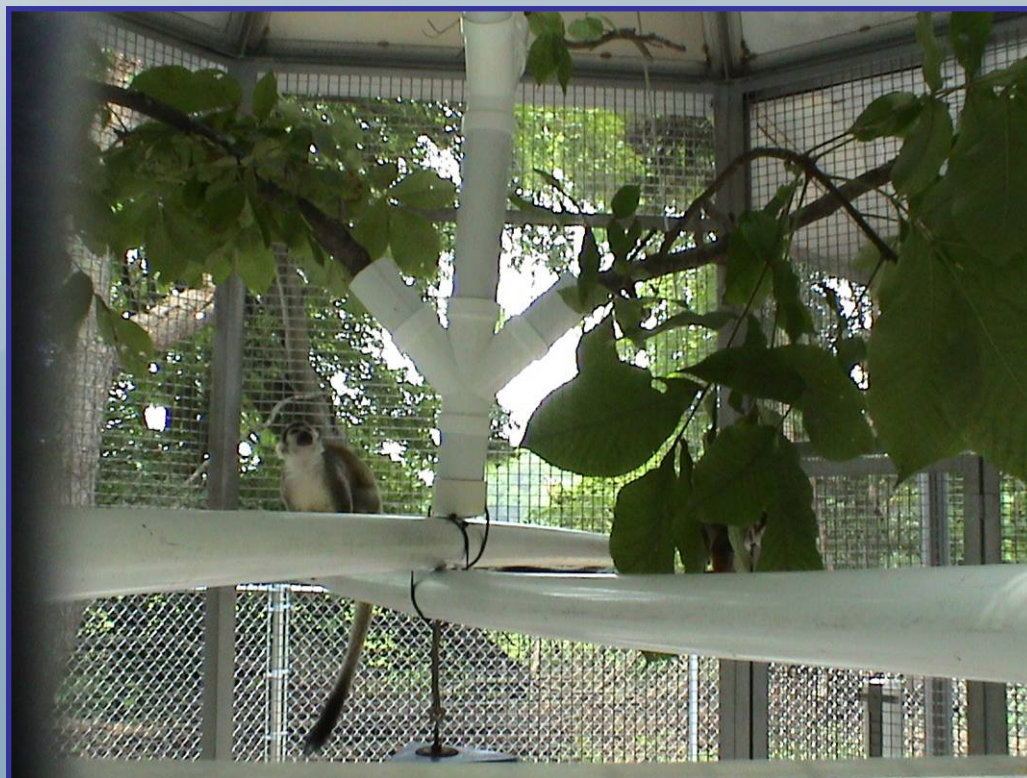
- Public Health Service Policy on Humane Care and Use of Laboratory Animals
- Guide for the Care and Use of Laboratory Animals



- Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching
- AVMA Guidelines on Euthanasia



Alternatives and the 3 Rs





Definition of Alternatives

- **Russell and Burch (1959) - *The Principles of Humane Experimental Technique***
 - Full text available online at AltWeb:
http://altweb.jhsph.edu/publications/humane_exp/het-toc.htm
- **Development of the concept of the 3 Rs:**
 - Reduction
 - Refinement
 - Replacement



Alternatives

The 3 Rs of Russell and Burch

Reduction - Minimize the number of animals used.

Refinement - Employ techniques that reduce pain and distress.

Replacement - Substitute animal with nonanimal methods or lower organisms.



Why Consider Alternatives?

- **Regulatory**
- **Social**
- **Humane**
- **Economic**
- **Scientific**



Regulatory

- **Comply with the Animal Welfare Act.**
- **Comply with the PHS Policy.**
- **Maintain AAALAC International accreditation.**





Social

- Respond to social pressures to
 - Change to non-animals as soon as possible *and*
 - Make research pain free.





Humane

- **Ask ethical questions such as**
 - **Should animals be used in research?**
 - **When should animals be used?**
 - **How should they be used?**



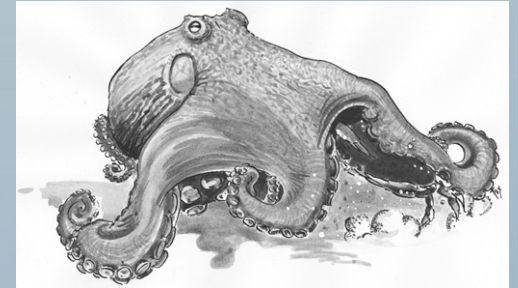
Economic



- **Reduce the expense of animal use in**
 - **Specialized facility infrastructure costs-**
such as caging, building design, and
equipment
 - **Purchase costs**
 - **Maintenance costs**
 - **Personnel costs *and***
 - **Occupational health and safety costs.**

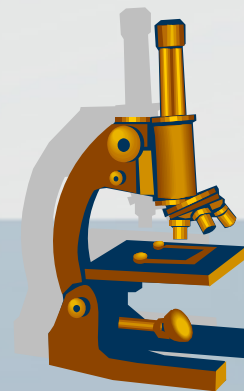
Economic

- **Animals lower on the phylogenetic scale may be cheaper and more plentiful.**
- **Non-animal models**
 - **May be cheaper to use *and***
 - **Could possibly increase the number of compounds that can be tested.**





Scientific



- **Keep current in area of research.**
- **Become aware of research from unfamiliar resources.**
- **Reduce duplication in research.**
- **Screen more compounds and predict their effects (computer automated structure evaluation system).**



Scientific

- **Find opportunities for less painful and invasive procedures.**
- **Learn insights into totally new approaches.**
- **Determine appropriate numbers.**
- **Identify possible collaborators.**
- **Reduce stress through proper handling, training, enrichment, group housing, etc.**



Group Exercise: The 3 Rs





Alternatives: *Reduction*

The Principles of Humane Experimental Technique (1959)

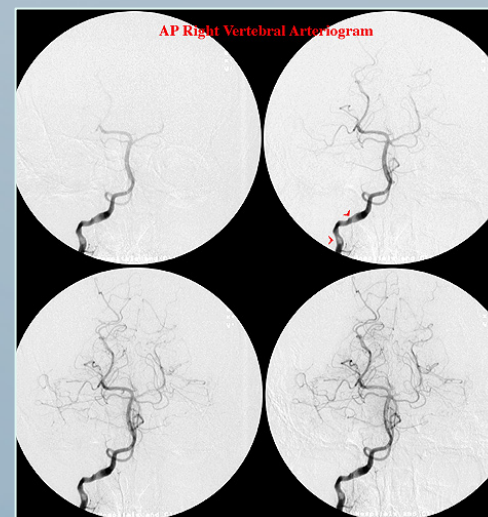
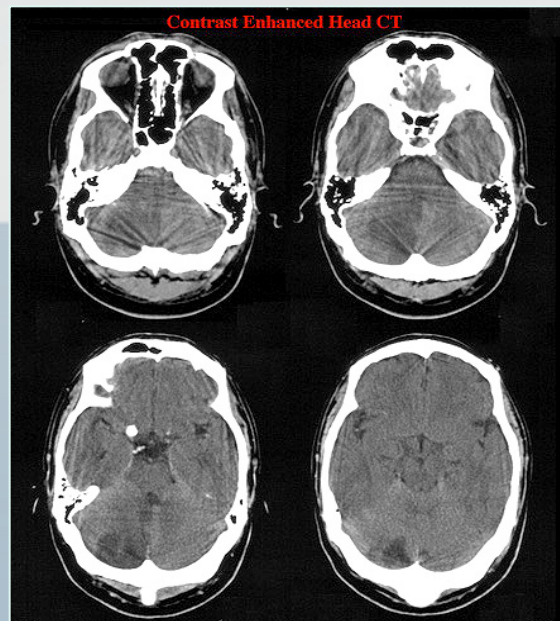
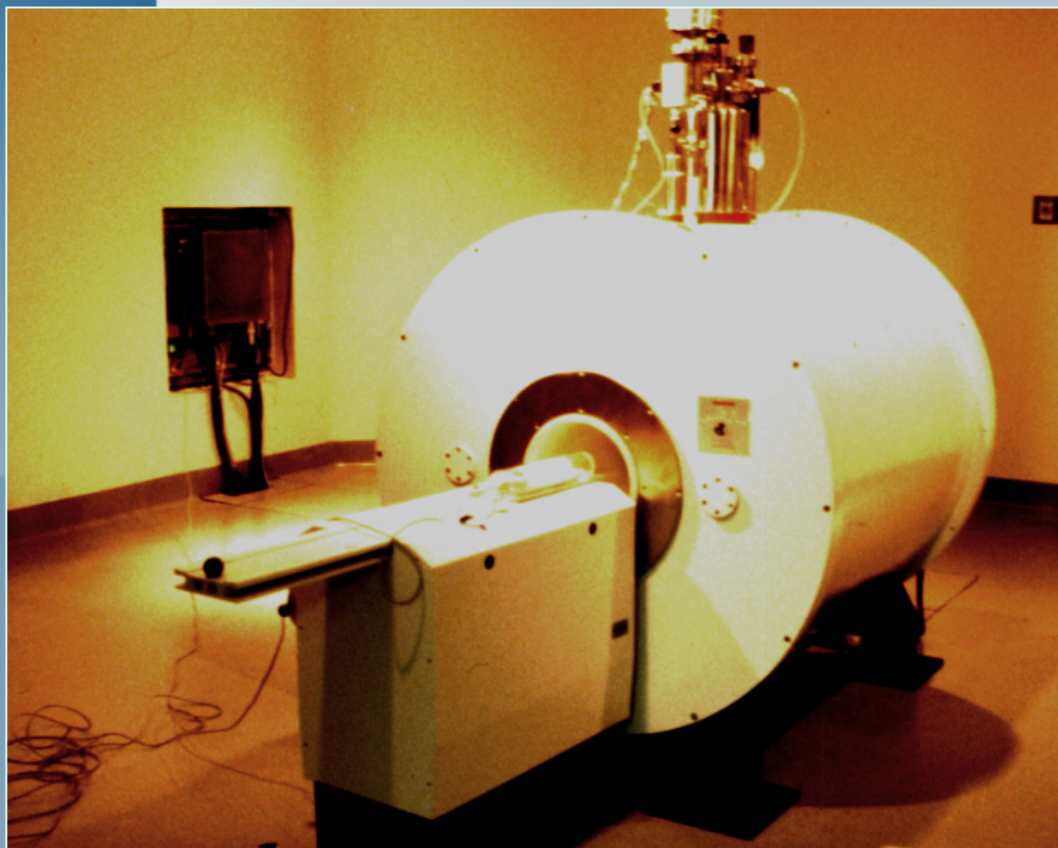


- **Quality literature search**
- **Appropriate statistical design**
- **Pilot studies**
- **Sharing animals, tissues, or organs**
- **New methods in testing**
(e.g. limit test, local lymph node assay, etc.)





Imaging





Alternatives: *Refinement*

The Principles of Humane Experimental Technique (1959)

- Knowledge of species physiology and normal and abnormal behavior
- Proper use of anesthetics and analgesics
- Modifications in restraint, handling, blood collection
- Increased sensitivity of monitoring devices and chemical assays
- Proper training of personnel



Social Housing



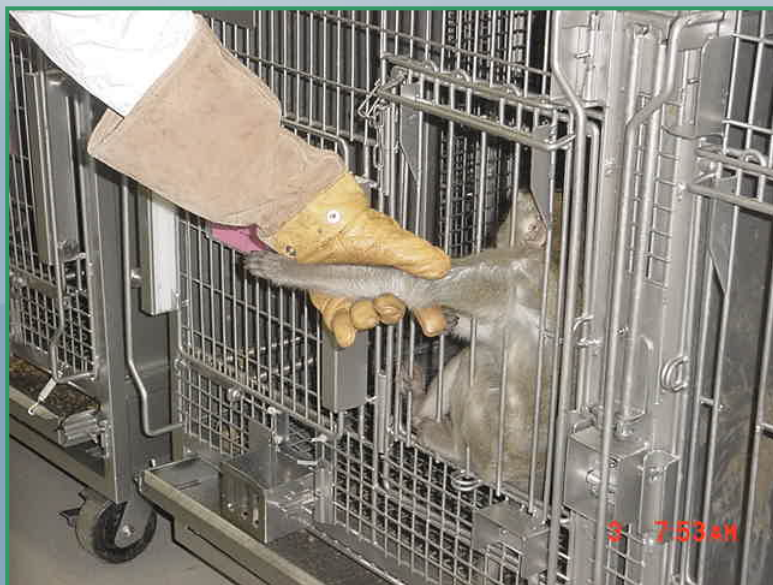


Cage Design





Handling and Training





Environmental Enrichment





Alternatives: *Replacement*

The Principles of Humane Experimental Technique (1959)

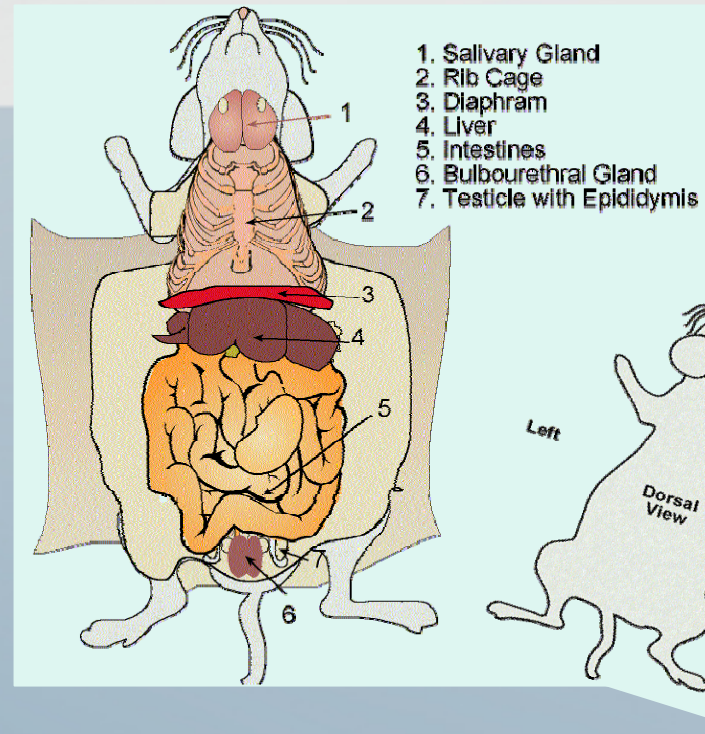
- **Relative replacement - some animal involvement**
 - Isolated cell and nerve preparations
 - Use of tissues from slaughter house or grocer
 - Computer simulations based on in vivo data



Virtual Alternatives

„Virtual dissection“

☑ Stretch the colon and cut it along its longitudinal axis similar to the pathologist's table



The Virtual Pig Dissection

- External Anatomy
- Respiratory System
- Circulatory System
- Digestive System
- Reproductive (male)
- Reproductive (female)



Non-animal Models Used in Teaching





Alternatives: *Replacement*

The Principles of Humane Experimental Technique (1959)

- **Absolute replacement** – no animal involvement
 - Endoparasites, plants microorganisms
 - Computer automated structure evaluation systems
 - Human tissue culture





Where Can I Find the Information?





Animal Welfare Information Center

AWA Defines Service at NAL

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

- **AWIC provides information**
 - **For employee training**
 - **To prevent unintended duplication and**
 - **About the 3Rs:**
 - **Reduce or replace animal use**
 - **Minimization of pain and distress**



Animal Welfare Information Center

AWIC

- **Serves as a comprehensive resource.**
- **Suggests search terms, strategy, and databases.**
- **Provides access to resources that you might not have.**
- **Refers you to experts at other institutions.**
- **Alerts you to additional information resources.**



Animal Welfare Information Center Services

- **Reference and referral**
- **Workshops**
- **Presentations**
- **Publication distribution**
- **Conference exhibits**
- **Committee members**



Animal Welfare Information Center Publications

- **Bibliographies**
- **Information Resource Guides**
- ***Animal Welfare Information Center Bulletin***
- **Fact Sheets**
- **Collaborations on proceedings, manuals, articles, and book chapters**

AWIC Homepage: <http://awic.nal.usda.gov>



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- [Advanced Search](#)
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- ▷ [Zoo, Circus and Marine Animals](#)
- ▷ [Companion Animals](#)
- ▷ [Government and Professional Resources](#)
- ▷ [Alternatives](#)
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- ▷ [Humane Endpoints and Euthanasia](#)

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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, teaching, and exhibition.

In the News

[More](#) ▶

[Plan Expedites Alternatives to Animal Testing](#)

[USDA COLLECTION PAGE: Humane Society of the United States' Handling Allegations](#)

[APHIS-2006-0150 - Animal Care Proposed Rule to Amend Regulations Covering Temperature Requirements for Live Animals in Transport OPEN for Public Comment until March 3, 2008](#)

Spotlights

[More](#) ▶



Legislative History of the Animal Welfare Act, 2007



Animal Euthanasia, 2007



Tuberculosis in Animals



West Nile Virus, 2007



Cats, 2007



Information Resources on the Care

I Want To...

- [Ask a Question](#)
- [Request USDA Forms for Licensing/Registration](#)
- [Get Help with a Literature Search](#)
- [Find Images or Videos for Educational Purposes](#)
- [Know Who Needs to be Licensed or Registered Under the AWA](#)
- [Recommend Materials for the AWIC Web Site](#)

[BOOKMARK](#)

RSS Feeds
from AWIC



Enforcement of the Animal Welfare Act



Databases

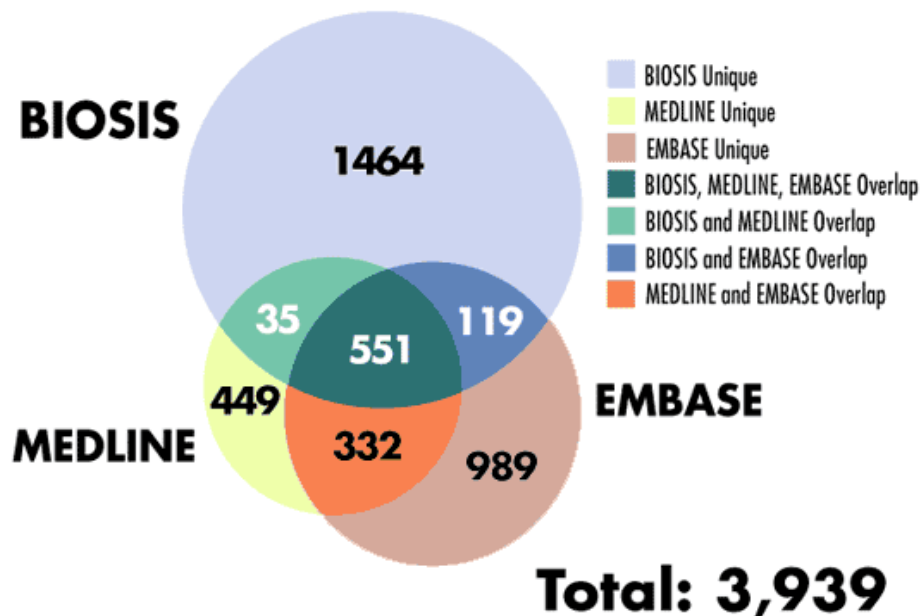
Biomedical and Biological

- AGRICOLA <http://agricola.nal.usda.gov> file 10
- CAB Abstracts file 50
- MEDLINE <http://www.ncbi.nlm.nih.gov/pubmed/> file 155
- ToxFile file 156
- EMBASE file 73
- BIOSIS file 5
- Zoological Record file 185
- PsycINFO file 11
- ASFA file 44
- Pascal file 144
- SciSearch file 434
- Current Contents file 440
- Scopus
- ScienceDirect
- Web of Science



Pharmacokinetics

pharmacokinetics and pain



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BIOSIS Unique records contain 415 Meeting records.

http://scientific.thomson.com/img/misc/biosis-strategies/venn_3way5_big.gif



Databases

Pharmaceutical and Technological

- **Pharmaceutical News Index** file 42
- **Intern'l. Pharmaceut. Abstracts** file 74
- **NTIS** file 6
- **INSPEC** file 2
- **Ei Compendex** file 8
- **Gale Group Computer Database** file 275
- **Japanese Science and Technology (J-EAST)**

<http://sciencelinks.jp/j-east/>

Databases

Federally-funded Research

- CRIS <http://cris.csrees.usda.gov/>
- CRISP <http://crisp.cit.nih.gov/>
- NTIS file 6
- FEDRIP file 266

Law and Legislation

- Gale Legal Resource Index file 150
- LexisNexis <http://www.lexisnexis.com/>
- Thomas <http://thomas.loc.gov/>
- State Statutes <http://www.law.cornell.edu/statutes.html>

Databases

Education



- ERIC <http://www.eric.ed.gov> file1
- AVAR <http://www.avar.org/alted/>
- EURCA <http://www.eurca.org/>
- Norwegian Reference Centre for Laboratory Animal Science & Alternatives
<http://oslovet.veths.no/NORINA/>
<http://oslovet.veths.no/teaching/materials.html>
<http://oslovet.veths.no/textbase/>



Additional Databases

Available on the Web

- DTIC Online

<http://multisearch.dtic.mil/dtic/>

- Alternatives to Skin Irritation Testing in Animals

<http://www.invitroderm.com/>

- Altweb

<http://altweb.jhsph.edu/>



Additional Databases

Available on the Web

- **DoD Biomedical Research Database**
<http://www.dtic.mil/biosys/org/brd/>
- **Scirus - scientific information search engine developed by Elsevier Science**
<http://www.scirus.com/>
- **Animal Welfare Institute Enrichment and Refinement Databases**
http://www.awionline.org/lab_animals/index.htm
- **PrimateLit**
<http://primatelit.library.wisc.edu/>



Organizations

- **European Centre for the Validation of Alternative Methods (ECVAM)**
<http://ecvam.jrc.cec.eu.int/index.htm>
- **Fund for the Replacement of Animals in Medical Experiments (FRAME)**
<http://www.frame.org.uk>
- **Interagency Coordinating Committee for the Evaluation of Alternative Methods (ICCVAM) and its supporting center, NICEATM (the National Toxicology Program Interagency Center for the Evaluation of Alternative Toxicological Methods)**
<http://iccvam.niehs.nih.gov/>
- **Johns Hopkins Center for Alternatives to Animal Testing (CAAT)**
<http://caat.jhsph.edu/>
- **National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs)**
<http://www.nc3rs.org.uk/>



Databases

Vendors

- DIALOG <http://www.dialog.com/>
- NLM's Databases <http://www.nlm.nih.gov/databases/>
- OVID <http://www.ovid.com/>
- CSA <http://www.csa.com/>
- EbscoHost <http://www.ebscohost.com>

AWIC Home Page - <http://awic.nal.usda.gov>

- Databases - <http://awic.nal.usda.gov/databases>



Subject Coverage of Selected Databases

AGRICOLA	ASFA	BIOSIS	CAB	ERIC	MEDLINE
General agriculture	Aquaculture	General agriculture	General agriculture	Adult, career, voc. Education	Clinical med.
Animal science	Aquatic science	Aerospace biology	Animal sci. & production	Education monographs	Experimental medicine
Chemistry & biochemistry	Biology & chemistry	Biochemistry & anatomy	Crop science	Info. resources	Pharmacology
Microbiology	Ecology	Bacteriology (microbiology)	Forestry	Science, math & environment	Microbiology
Cytology	Policy	Cell biology	Pest control	Teacher ed.	Administration
Human & animal nutrition	Pollution	Botany	Human nutrition	Education management	Nutrition
Biotechnology	Law	Anatomy	Biotechnology	Higher ed.	Nutrition
Physiology	Policies	Physiology	Pesticides	Tests & testing	Anat. & physiol.
Vet. Medicine	Marine biol.	Clinical med.	Vet. Medicine		Vet. Medicine
Wildlife	Acoustics and optics	Pathology	Machinery and buildings		Occupational medicine
Zoology	Fisheries	Biophysics	Economics		Toxicology
Entomology	Diving	Toxicology			Other med. topics
Other topics	Other topics	Other topics			

Subject Coverage of Selected Databases



EMBASE	CURRENT CONTENTS	ZOOLOGICAL RECORD	PASCAL 63% Eng., 12% Fr	INSPEC
Clinical med.	Clinical med.	Zoological info.	Agricultural science	Computer science
Experimental medicine	Life sciences	Behavior & communication	Tropical medicine	Computer applications
Pharmacology, drugs, potential drugs	Engineering tech. & applied sciences	Physiology, immunology	Energy	Computer hardware
Biochemistry	Physical chem. & earth sciences	Biochemistry	Metals/metallurgy	Control applications
Developmental biology	Social and behavioral sciences	Disease	Earth science	Control systems
Forensic med.	Arts & humanities	Evolution	Build. & public works	Systems & contr. theory
Health econ.		Genetics	Information science	Information science
Occup. health		Histology	Biomedicine	
Toxicology		Taxonomy	<i>(no animal husbandry)</i>	
		Life cycles/develop.	<i>(no odontology)</i>	
		Nomenclature	<i>(no vet. Pathology)</i>	
		Paleontology		



Sources of Information for Selected Databases

AGRICOLA	ASFA	BIOSIS	CAB	ERIC	MEDLINE
1970-present	1971-present	1926-present	1972-present	1966-present	1950-present
~ 1,000 journals	> 5,000 journals	~ 5,000 journals	> 9,000 journals/ trans.	Tech./ research reports	4,300 journals
Books, Monographs	Books	Books, Monographs	Books, Monographs	Books, Monographs	
Proceedings	Proceedings	Proceedings/abs	Symposia	Proceedings	
Research rept.	Research rept.	Technical reports	Technical reports	Bibliographies	
Theses		Nomenclat. Rules	Theses, Dissertations	Reviews, Opinion papers	
Transl.—var.		Annual reviews	Review journals	Legal materials	
Bibliographies		Bibliographies	Bibliographies	Theses, Dissert.	
Elect. docs.		Patents 86-89	Patents	Journals	
Audio visuals		Letters/notes	Annual reports	Teaching guides	
USDA pubs.		Guides	Guides	Software Desc.	
Gov. docs		Research comm.	Conferences	Directories	
Selected newsltrs		Conferences	Meetings	Course descrip.	
Manuals/sops		Symposia		Govt. docs.	
Tox. protocols		Meetings		Audiovisuals	

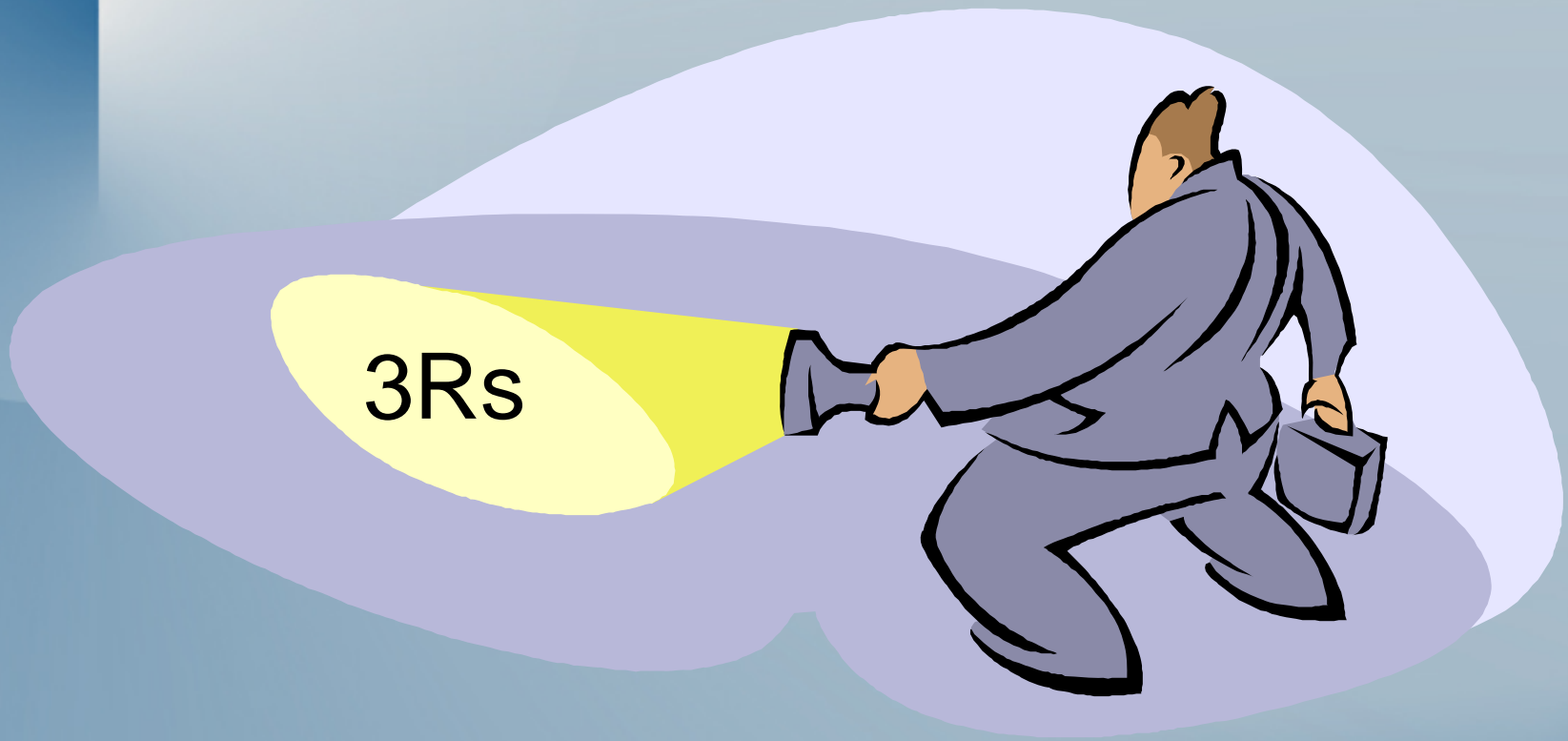


Sources of Information for Selected Databases

EMBASE 1974-present	CURRENT CONTENTS 1990-present	ZOOLOGICAL RECORD 1878-present	PASCAL 1973-present	INSPEC 1969-present
~ 3,700 journals	6,500 journals	~ 5,000 journals	> 8,500 journals scanned	> 3,800 journals
Books	Journals	Books, Monographs	Books, Monographs	Books , Monographs
Conference proceedings, Symposia, Meetings		Conference proceedings, Symposia, Meetings	Conference proceedings, Symposia, Meetings Journals	Conference proceedings from journals, Symposia, Meetings
		Special reports	Technical reports	Reports
		Theses	Theses, Dissertations	Theses, Dissertations
			Patents 1980-present	



Searching for Alternatives





AWIC's Approach to Meeting the Information Requirements

- Approach the search in two phases.
- Analyze the protocol to determine where alternatives might be used and for terminology.
- Decide where to go for the information.
 - Databases
 - Websites
- Link terminology appropriately for best search results.
- Evaluate the search results.



Searching for Alternatives

- Consists of three types of terms:
 - Scientific terms related to the research protocol;
 - Alternative (3Rs) terminology; and
 - Search terminology: boolean operators, limits, truncations, years, types of materials...



Searching for Alternatives

Tips

- Description of protocol and area of study
- Species being used
- Organ systems involved
- Acronyms (CNS, BSE, MAb)
- Spelling (behavior, behaviour)
- Names of hormones, enzymes, CAS#, trade names (xylazine = rompun)
- Authors in the field including the PI
- Is the PI aware of any possible alternatives?
- Previous searches with keywords, years and databases searched



Searching for Alternatives

Search Strategy

Two Phases

- ***Phase I:*** Reduction and refinement-citations pertinent to PI's field of study.
- ***Phase II:*** Replacement- use of nonanimal or alternative animal models.



Searching for Alternatives

Alternative Terms: *Refine and Reduce*

- analgesic or analgesia or painkiller
- technique or method or procedure
- anesthetic or anasthetic or anaesthetic
- monitor or evaluate or supervise
- restrain or immobilize or restrict
- positive reinforcement or animal training
- housing or facility or caging

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



Searching for Alternatives

Alternative Terms: *Replacement*

- artificial or vitro or culture
- tissue or cell or organ
- insect or arachnid or invertebrate
- fish or mollusc or cephalopod
- simulation or digital image or interactive
- mannequin or manikin or model

Animal Use Alternatives Thesaurus

<http://www.nal.usda.gov/awic/alternatives/alternativeanimalusethesaurus.htm>



Searching for Alternatives

Terminology Examples

sedative

animal testing alternative

environmental enrichment

bacteria

software

video display

welfare

well-being

assay

virtual surgery

virtual reality

cadaver

plastinate

anxiolytic

euthanasia

pain or distress

virus

amphibian



Searching for Alternatives

DIALOG Commands

Command	Abbreviation	Example	Description
Begin	<i>b</i>	b 10,155,5,73	Begin database 10 (Agricola), 155 (Medline), etc.
Select	<i>s</i>	s dog	Select citations with the word "dog"
Type	<i>t</i>	t s2/6/1-5	Type search set #2, title format, citations 1 to 5
Display sets	<i>ds</i>		Shows the entire search strategy
Remove duplicates	<i>rd</i>		Keeps only unique records
Show files	<i>show files</i>		Lists databases you are using and years covered
Log off	<i>logoff</i>		Ends the session



Searching for Alternatives

DIALOG Print Formats

Free (6) - Title and Publication Year

Short (8) - Title, Indexing, and Publication Year

Medium (3) - Bibliographic Citation

Long (7) - Bibliographic Citation and Abstract

Full (9) - Full Record

KWIC - Key Word in Context

Note: Format Numbers are used in the type command.

t s2/6/1-5 = type search set #2, title format, citations 1-5



Searching for Alternatives

DIALOG Commands

- **?** Truncation
s behav? = behave, behaves, behaviour, behavior, etc.
- **OR** Select at least ONE word from set.
s swine or pig or pigs or porcine
- **AND** Select more than one word from set.
s swine and euthan?
- **NOT** Eliminates a search term or group of search terms.
s (pig or pigs or swine or porcine) not guinea
- **TI,DE,ID** - Limit terms to title, descriptors, or identifiers.
s (dog or dogs or cani?)/ti,de,id **use "/" before ti,de,id*

Note: Use of parentheses is very important !



Searching for Alternatives

DIALOG Commands

- **(W) With** - Keep words adjacent and the order specified.
s lethal(**w**)dose = lethal dose
s route(**1w**)administration = route of administration
- **(N) Near** - Keep words adjacent but in either order.
s blood(**n**)sampl? = blood sample or sampling blood
s blood(**2n**)sampl? = blood sample, blood plasma
sample, sampling of arterial blood



Alternatives Search Examples





Searching for Alternatives

Sample Search #1 - Osteomyelitis

Objective/Hypothesis

The environment of an open fracture can be manipulated in both a salutary and degrading fashion with respect to the establishment of acute osteomyelitis. L-fucose should decrease and arachidonic acid should increase the propensity toward infection in comparison with controls.



Searching for Alternatives

Osteomyelitis Search Background

Military Relevance

Contaminated trauma through open fractures due to high velocity missile wounds are common military combat injuries. An inexpensive method of prevention of chronic osteomyelitis would be useful in the field and hospital setting.



Searching for Alternatives

Osteomyelitis Search Information

Materials and Methods

- Animals: Albino Sprague-Dawley rats will be used.
- Bacteria: Strain SMH of *Staphylococcus aureus*.



Searching for Alternatives

Osteomyelitis Search Information

Technical Methods

Pain Alleviation:

The rats will be anesthetized with a cocktail of 1.5 ml ketamine and 1.5 ml xylazine and 0.5 ml acepromazine given at a dosage of 0.5 to 0.7 ml/kg. If the plane of anesthesia is too light as determined by a positive toe pinch reflex, one half the original cocktail dose or isoflurane may be given. Buprenorphine will be given up to 3x/day if the animal shows signs of pain.



Searching for Alternatives

Osteomyelitis Search Information

Establishment of infection

Tibia exposed and wound created in the bone with dental burr. Wound inoculated with *S. aureus* or *S. aureus* with L-fucose or arachidonic acid, allowed to incubate and rinsed with sterile saline. Wound is closed and animals sampled at various times to track development of osteomyelitic lesions.



Searching for Alternatives

Osteomyelitis Search Strategy

AGRICOLA	file 10
MEDLINE	file 155
CANCERLIT	file 159
CAB	file 50
BIOSIS	file 5
PASCAL	file 144
EMBASE	file 73
Japanese Science and Technology	



Searching for Alternatives

Osteomyelitis Search Strategy

Set	Term Searched	Items
S1	OSTEOMYELIT?	37339
S2	L(W)FUCOSE OR ARACHIDONIC (W) ACID	128060
S3	S1 AND S2	27
S4	RD (unique items)	15
S5	ACUTE(3N)S1	2346
S6	STAPH? (W)AUREUS	168795
S7	S5 AND S6	489
S8	RD (unique items)	291
S9	TRAUMA? OR POSTTRAUMA?	448998
S10	S9 AND S6	1551
S11	S10 AND S1	269
S12	RD (unique items)	174



Searching for Alternatives

Osteomyelitis Search Strategy

Set	Term Searched	Items
S13	VITRO OR CULTURE OR ISOLATED (4N) (BONE OR TIBIA)	3912224
S14	S13 AND S1	2232
S15	S14 AND S6	596
S16	RD (unique items)	383
S17	S14/TI,DE AND S6/TI,DE	393
<u>S18</u>	<u>RD (unique items)</u>	<u>299</u>
S19	KETAMINE OR XYLAZINE OR ACEPROMAZINE OR BUPRENORPHINE OR YOHIMBINE	72600
S20	S1 AND S19	7
S21	S2 AND S19	234
<u>S22</u>	<u>RD (unique items)</u>	<u>153</u>



Searching for Alternatives

Sample Search #2 – Mouse Lungs

Purpose

To evaluate the safety and efficacy of different formulations in mouse lungs. These studies will help determine how the body will react to single or repeat doses, how the drug affects the disease, and how long the drug lasts.



Searching for Alternatives

Mouse Lungs Search Information

Materials and Methods

- Animals – mice
- Test articles - Viral vectors, cationic lipid-DNA complexes, etc.
- Anesthesia - Isoflurane



Searching for Alternatives

Mouse Lungs Search Information

Technical Methods

Pain Alleviation

The animals will be anesthetized with isoflurane until they are no longer responsive to a toe pinch reflex.

Torbugesic or diazepam may be given post-procedurally.



Searching for Alternatives

Mouse Lungs Search Information

Administration of Test Articles

The lower jaw and tongue are immobilized with light pressure applied to minimize swallowing of fluid. Test article is applied to the nares and the animal is released 3-5 seconds after inhalation of fluid.



Searching for Alternatives

Mouse Lungs Search Information

Blood Collection

Blood will be collected under anesthesia via the retro-orbital plexus. Blood may also be collected via tail nick.

Euthanasia by cervical dislocation, CO₂ or barbiturate overdose.



Searching for Alternatives

Mouse Lungs Search Information

Question

Are there alternatives to the painful or distressful procedures being employed in the research on the delivery of test articles to mouse lungs?



Searching for Alternatives

Mouse Lungs Search Strategy

What to Look for When Searching

- Alternative instillation techniques
- Research on similar test articles performed by others
- Alternative blood collection techniques
- Possible confounding effects of proposed anesthetic/analgesics/anxiolytics.



Searching for Alternatives

Mouse Lungs Search Strategy

AGRICOLA	file 10
MEDLINE	file 155
CAB	file 50
BIOSIS	file 5
EMBASE	file 73



Searching for Alternatives

Mouse Lungs Search Strategy

Set	Terms Searched	Items
S1	INTRANASAL?	34283
S2	MOUSE OR MICE	2116730
S3	S1 AND S2	7192
S4	METHOD? OR TECHNIQUE? OR ASSAY? OR TEST OR TESTS OR PROCED?	10542290
S5	S3 AND S4	2219
S6	S1/TI AND S4/TI	230
S7	RD (unique items)	142



Searching for Alternatives

Mouse Lungs Search Strategy

Set	Terms Searched	Items
S8	GENE (W) THERAPY OR (GENE OR GENETIC) (3N) (VECTOR?)	83042
S9	(S1 OR PULMONARY OR INTRAPULMONARY OR LUNG OR LUNGS) (4N) (ADMINIST? OR INSTILL?)	52484
S10	S8 AND S9	377
S11	RD	252
S12	(BLOOD) (5N) (SAMPL? OR COLLECT? OR BLEED?)	418129



Searching for Alternatives

Mouse Lungs Search Strategy

Set	Terms Searched	Items
S13	REPEAT? (4N) S12	3007
S14	S13 AND S2	101
<u>S15</u>	<u>RD</u>	<u>42</u>
S16	S12 AND (RETROORBIT? OR RETRO(W)ORBIT? OR ORBITAL?) AND S2	118
<u>S17</u>	<u>RD</u>	<u>61</u>
S18	ISOFLURANE	24016
S19	S9 AND S18	326
<u>S20</u>	<u>RD</u>	<u>288</u>



Group Exercise

Develop a search strategy for the following teaching protocol.



Searching for Alternatives

Sample Search #3 - Trauma

Dr. Stan Breager uses pigs and dogs in his advanced trauma life support training course. All procedures are conducted on anesthetized animals. When the training session is complete, all animals are euthanized. His IACUC has requested that he search for any potential alternatives to the use of animals.



Searching for Information on the Web

- **Choose Your Words Wisely**
Improve your search results by being specific.
- **Consider International Spellings**
behavior, behaviour tumor, tumour estrogen, oestrogen, anaesthesia, anesthesia, anasthesia
- **Bookmark Search Results**
Once you've created a Web search that's giving you great results, use your browser's standard functions for bookmarking the URL.
- **Know Where to Look**



Searching for Information on the Web

- **Quotation marks:**

Enclosing a multiword phrase in quotation marks tells the search engine to list only sites that contain those words in that exact order.

“animal welfare”

- **Plus and minus signs:**

A plus sign (+) directly in front of a word indicates that the word or phrase must appear in the search results.

tail-biting +pigs

A minus sign (-) indicates that the word or phrase should not be included in the search results.

pigs -gilts



Search Evaluation

The PI Role

- Check terminology, strategy, sources, and dates of search.
- Review the search **before** completing the protocol.
- Assess and evaluate the alternative possibilities.
- Be prepared to support the use or non-use of any alternatives in writing.
- Keep a copy of strategy, databases searched, and years of search for future use.



Search Evaluation

The IACUC Role

- Review the protocol form. Are the questions asked in a clear way to gather the information needed?
- Review the
 - Databases searched,
 - Terminology used *and*
 - Years of coverage.
- Review the search strategy.
- Ask about the order of search and protocol writing.
- Have an information provider on the committee as a resource.



Search Evaluation

RED FLAGS



- Search completed at the last minute.
- Only 1 database searched.
- Terms only for painful aspects.
- The term “alternative” used alone with no other alternative 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).



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