Ethical Care and Use of Animals in Research
Animal use definition and examples

History of animal welfare regulations

Ethical and humane use of animals

Requirements before working with animals
“Any live, vertebrate animal used or intended for use in research, research training, experimentation, or biological testing or for related purposes”
Why Use Animals in Medicine, Biology and Biomedical Research?

Animals as spare parts
Animals as factories
Animals as models for human disease
Animals as test subjects
Animals to study basic physiological principles and integration of systems
   Evolutionary and comparative physiology
   Novel solutions to complex problems
   Bioinformatics, comparative genomics, proteomics, metabolomics
   Systems biology

Animals for the study of animals and the environment
   Conservation biology
   Ecological interactions and community structure
   Veterinary medicine

Animals to study basic principles in biology
   Evolutionary biology
   Experimental evolution
   Population genetics
   Population genomics
   Animal behavior

Animals for the study of disease
   Virology and viral evolution
# Benefits of Animal Research

<table>
<thead>
<tr>
<th>Human Disease/Condition</th>
<th>Animal Models</th>
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<tbody>
<tr>
<td>Penicillin</td>
<td>Mice</td>
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<td>Blood Transfusions</td>
<td>Dogs</td>
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<tr>
<td>Tuberculosis Medicine</td>
<td>Guinea pigs</td>
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<td>Meningitis Vaccine</td>
<td>Mice</td>
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<td>Kidney Transplants</td>
<td>Dogs and Pigs</td>
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<tr>
<td>Breast Cancer Treatments</td>
<td>Mice, Rats and Dogs</td>
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<tr>
<td>Asthma Inhalers</td>
<td>Guinea Pigs and Rabbits</td>
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<td>Polio Vaccine</td>
<td>Mice</td>
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<td>Insulin for Diabetics</td>
<td>Dogs</td>
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<tr>
<td>Deep Brain Stimulation for Parkinson's Disease</td>
<td>Monkeys</td>
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</tbody>
</table>
Benefits Continued...

- Vaccine for Smallpox
- Vaccine for Anthrax
- Rabies Vaccine
- Typhoid Vaccine
- Cholera Vaccine
- Treatment for Beriberi
- Treatment for Rickets
- Corneal Transplants
- Local Anaesthetics
- Discovery of Vitamin C
- Canine Distemper Vaccine
- Coronary Bypass Operation
- German Measles Vaccine
- MMR Vaccine
- Antidepressants and Antipsychotic
- CT Scanning for Improved Diagnosis
- Chemotherapy for Leukaemia
- Medicines to Treat Ulcers
- Inhaled Asthma Medication
- Combined Therapy for HIV infection
- Medicines for Type 2 Diabetes
- Cervical Caner Antibodies
- Bird Flu Vaccine
- Malaria Vaccine
US Yearly Benefits of Animal Research

450,000  Prescriptions for anabolic (growth) hormones

520,000  Heart bypass operations

1,500,000 Prescribed for Erythropoietin (for Anaemia)

34,000,000 Anticoagulants dispensed

95,000,000 Prescriptions for asthma

150,000,000 Prescriptions for antibiotics

2. Source: IMS Health, ClinicalPlus
5. Source: IMS Health, IMS National Prescription Audit
6. US Center for Disease Control and Prevention
Veterinary advances

Vaccines developed to protect pets, farm animals, working animals and animals in the wild

<table>
<thead>
<tr>
<th>Dogs</th>
<th>Horses</th>
<th>Cattle</th>
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<tr>
<td>Leptospirosis</td>
<td>Equine influenza</td>
<td>Louping ill</td>
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<tr>
<td>Canine viral hepatitis</td>
<td>Equine herpes</td>
<td>Orf</td>
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<tr>
<td>Canine parvovirus</td>
<td>Tetanus</td>
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<tr>
<td>Canine parainfluenza</td>
<td>Rabies</td>
<td>Lungworm</td>
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<td>Kennel cough</td>
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<td>Clostridial toxoids</td>
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<td>Rabies</td>
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<td>Foot and mouth disease</td>
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<tr>
<th>Cats</th>
<th>Pigs</th>
<th>Birds</th>
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<tr>
<td>Feline enteritis</td>
<td>Aujeszky's disease</td>
<td>Marek's disease</td>
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<tr>
<td>Feline parvovirus</td>
<td>Swine erysipelas</td>
<td>Paramyxovirus</td>
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<td>Feline leukaemia</td>
<td>E coli infections</td>
<td>Herpes</td>
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<tr>
<td>Cat flu syndrome</td>
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<td>Infectious bursal disease</td>
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<tr>
<td>Chlamydial</td>
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<td>Avian encephalomyelitis</td>
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<td>Rabies</td>
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<td>Newcastle disease</td>
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<tr>
<th>Foxes</th>
<th>Rabbits</th>
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<tr>
<td>Rabies</td>
<td>Myxomatosis</td>
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<td></td>
<td>Viral haemorrhagic disease</td>
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<th>Sheep</th>
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<tr>
<td>Enzootic abortion</td>
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<td>Marek's disease</td>
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<tr>
<td>Pasteurialia</td>
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<td>Paramyxovirus</td>
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<td>Clostridial toxoids</td>
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<td>Infectious bursal disease</td>
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<td></td>
<td>Avian encephalomyelitis</td>
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<td>Newcastle disease</td>
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<tr>
<td></td>
<td></td>
<td>Infectious bronchitis</td>
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The Numbers...

Number of Animals Used Annually for Research in the US (Species covered by the Animal Welfare Act)

Year
Numbers in Perspective

- Research exc. Mice, rats and birds: 1
- Research inc. Mice, rats and birds: 26
- Hunting: 150
- Killed by Automobiles: 365
- Ducks for food: 1
- Cattle, sheep, calves for food: 38
- Pigs for food: 105
- Chickens for food: 9,031

Millions of animals killed
Pain - The Percentages

“Some Pain, No Anaesthesia”

This is only the case when anaesthesia (or other pain relief) would have affected results e.g., when testing another pain relief drug.
Examples of Animal Use at UCI

- development of new therapies for humans and animals
- pre-clinical drug/device trials
- classes to teach surgical and other medical techniques
- behavioral studies
- tissue harvest for in-vitro studies
- comparative and evolutionary studies
Why Worry about Animals?

• Required by Law

• It’s the right thing to do
  – Morally and Ethically
  – Scientific Validity
Ethical Arguments for Animal Use

• **Nuremberg Code of Ethics in Medical Research**
  – “... be designed and based on results of animal experimentation and a knowledge of the natural history of the disease…” 1947

• **Declaration of Helsinki**
  – “Medical research involving human subjects... generally accepted scientific principles...and, where appropriate, animal experimentation.”
    - World Medical Association, 1964
• The use of animals is a privilege, not a right
  – Society grants permission to use animals with the expectation that knowledge will be advanced, and health benefits may be derived
  – The perceived value to society must balance the adverse effects imposed on individual animals.
• Animal Welfare Act (AWA): USDA Animal Welfare Regulations

• PHS Policy - Health Research Extension Act (HREA)

• The Guide for the Care and Use of Laboratory Animals (The Guide)
Lucky is a hero. He is a human-owned English pointer with a few black and white spots of good measure. Born in a shelter some years ago, he's now the center of a training program that teaches him to hunt and to be a good hunter. Lucky was donated to the U.S. Department of Agriculture by a hunter who was unable to keep him.

Lucky's trainer works with other dogs at the university training facility. The dogs undergo several months of training before they are released into the wild. The purpose of the training is to teach the dogs to hunt and to be good hunters. Lucky is one of the dogs that have been trained in this program.

Pets for sale—no questions asked

CONCENTRATION CAMPS FOR DOGS

Captured by STAR WAYMAN
• Raid of a Baltimore, MD animal dealer by Humane Society of the United States (HSUS)
• 29 charges of animal cruelty brought against Lester Brown
• Congress put forth eight bills to outlaw inhumane treatment of animals
• 1966: Congress enacted the Pet Protection Act
  – Protected against theft of pets by research dealers
  – Gave authority to USDA to enforce and administer the Act
  – Provided protection to dogs, cats, rabbits, monkeys, guinea pigs and hamsters
Pet Protection Act (cont’d)

- Established humane standards for treatment of animals
- Set licensing requirements for animal dealers
- Required annual USDA inspections of dealers and research institutions
1985 Animal Welfare Act Amendment

- Establishment of an Institutional Animal Care and Use Committee (IACUC)
- Requirements for veterinary consult and oversight
- Requirements for canine exercise and non-human primate psychological enrichment
- Requirements for consideration of alternatives to animal use and painful procedures and avoidance of unnecessary duplication of already-conducted studies
• Enforces and administers the Animal Welfare Act (AWA)
• Enforces the AWA through Animal Welfare Regulations (AWRs)
  – 9 CFR Chapter 1, Parts 1-3
• Provides clarification of AWRs through Animal Care policies
USDA Regulations

• Set requirements for committee (IACUC) composition and function
• Provide performance standards for:
  – veterinary care
  – animal husbandry
  – animal transportation
• Covers all “warm-blooded” animals
  – excludes rats, mice and birds
• Health Research Extension Act is the legislative mandate for Public Health Service (PHS) policy
• Covers all vertebrate animals
• NIH funded institutions must adhere to the PHS Policy
• Office of Laboratory Animal Welfare is responsible for assuring compliance with PHS policy
Federal Oversight

Universities, Research Institutes and Private Companies
IACUCs

Local oversight
Key Elements of the Federal Regulations

- Justify why animals are necessary
- Minimize pain and distress
- Personnel must be qualified to perform their duties
- Provide appropriate husbandry and care
- Use of appropriate euthanasia methods
Ethical Guidance

• 1996 NASA Principles for Ethical Care & Use of Animals: “Sundowner Report”

• *Principles of Humane Experimental Technique* by W. M. Russell and R. L. Burch, 1959
• Respect for Life
  – All living creatures deserve respect

• Societal Benefit
  – Some valuable return in exchange for the sacrifice of the animal’s life

• Non-maleficence
  – “Do no harm”
  – Pain, distress and discomfort to the animals must be minimized
The “Guide”

Performance Standards
- Institutional policies and responsibilities
- Animal environment, housing, and management
- Veterinary medical care
- Physical plant (facilities)
Institutional Animal Care and Use Committee (IACUC)

• Required by the AWRs, PHS Policy and *The Guide*
• Provides local (institutional) oversight of animal use in research, teaching and testing
• Members appointed by the Institutional Official (Associate Vice Chancellor for Research at UCI)
Institutional Animal Care and Use Committee

- Campus committee charged with oversight of UCI’s animal program
- Member Composition:
  - Faculty with animal expertise
  - Attending Veterinarian
  - Non-scientific member
  - Unaffiliated member
  - Biosafety officer
The IACUC’s Role

- Review and approve activities involving animals (protocol review)
- Review the animal program and inspect all facilities every 6 months
- Review concerns involving animal use
- Investigate issues of non-compliance
- Report to regulatory agencies
What Activities Require Review?

Definition:

“Any live, vertebrate animal used or intended for use in research, research training, experimentation, or biological testing or for related purposes.”

- PHS Policy
• Rationale for the use of animals
• Justification of the species and number of animals
• Conduct of experiments
• Unnecessary duplication of experiments
• Appropriate sedation, analgesia, anesthesia
• Adequate training of personnel
• Protocols must address the “3-Rs”
The 3 Rs

- **Replacement**
  - Use of live animals as the research model should be replaced if possible

- **Refinement**
  - Procedures should be refined to minimize pain, distress and discomfort

- **Reduction**
  - Number of animals should be reduced to the minimum necessary to achieve scientific significance without increasing pain and distress
Other IACUC Responsibilities

- Modifications to Existing Protocols
- Annual and three-year renewals
- Program Evaluation
- Facility Inspections
University Laboratory Animal Resources (ULAR)

- **Functions:**
  - Veterinary care & health surveillance
  - Daily husbandry/care
  - Animal procurement
  - Facility maintenance
    - Including vivarium access
  - Transgenic Mouse Facility
Veterinary Services

• Veterinary care of all research animals on campus
• Report to the IACUC regarding issues related to the animal care program
• Training for research personnel in animal handling, basic procedures, etc.
• Complete listing of services at ULAR website: http://www.rgs.uci.edu/ular/index.htm
Animals Used in Research

- Purpose bred rodents
- dogs, cats, pigs etc

http://www.statisticbrain.com/animal-testing-statistics/
The design of animal facilities combined with appropriate animal housing and management are essential contributors to animal well-being, the quality of animal research and production, teaching or testing programs involving animals, and the health and safety of personnel. An appropriate Program (see Chapter 2) provides environments, housing, and management that are well suited for the species or strains of animals maintained and takes into account their physical, physiologic, and behavioral needs, allowing them to grow, mature, and reproduce normally while providing for their health and well-being.
Education

IACUC

Institutional Official

Campus Vet

PI