

Review of 2010 *Comparative Medicine*

Workshop in Laboratory Animal Medicine
North Carolina State University
May 19, 2011
Douglas K. Taylor, DVM, MS, DAACLAM

Comp Med 60(1)

February 2010

Doug's Quick Tips

- Read *everything* and take notes
 - *Least* emphasis on novel/specific results
 - Subsequently study only your notes
- Focus on facts that you can actually remember
 - ~500 pages in 2010 Comp Med x 3 years x Other Journals x Other resources = you gotta cut bait at some point
- Try to lump papers by topic
- Try to formulate a 'few' reasonable questions from any given paper
 - Bear in mind that the exam questions must be backed by 2 references
- Think about papers in 2 ways:
 - Is there content from the paper that might serve as a question?
 - Does the paper serve to prompt a question about other classic core material?

7,12-Dimethylbenz[A]Anthracene Induces Sertoli-Leydig-Cell Tumors in the Follicle-Depleted Ovaries of Mice Treated with 4-Vinylcyclohexene Diepoxide

Zelleann R Craig,¹ John R Davis,² Samuel L Marion,³ Jennifer K Barton,⁴ and Patricia B Hoyer^{1*}

Disclaimer

- **This is not an ACLAM sanctioned presentation**
- **All information is deemed reliable and correct**
 - No warranty for accuracy
- **No information presented is known to be specifically included in the ACLAM Board Certification Exam**

Which of the following is/are a murine model(s) of osteoporosis?:

1. Ovarian follicle ablation with 4-vinylcyclohexene diepoxide
2. Surgical removal of ovaries
3. Ovarian follicle ablation with Dimethyl-benzanthracene
4. Ovarian stimulation with follicle stimulating hormone
5. Ovarian stimulation with pregnant mare serum gonadotropin

Which of the following is/are a murine model(s) of osteoporosis?:

1. **Ovarian follicle ablation with 4-vinylcyclohexene diepoxide**
2. **Surgical removal of ovaries**
3. Ovarian follicle ablation with Dimethylbenzanthracene
4. Ovarian stimulation with follicle stimulating hormone
5. Ovarian stimulation with pregnant mare serum gonadotropin

1. Hematoxylin and Eosin stain?
2. Acid fast stain?
3. Immunofluorescent stain?
4. Immunohistochemical stain?
5. Silver stain?



Which of the following best characterizes a B6C3F1 mouse?:

1. They are coisogenic to the C57BL/6J strain
2. They are congenic
3. They are outbred
4. They are the progeny of two inbred strains
5. They are excellent breeders



1. Hematoxylin and Eosin stain?
2. Acid fast stain?
3. Immunofluorescent stain?
4. **Immunohistochemical stain?**
5. Silver stain?



Which of the following best characterizes a B6C3F1 mouse?:

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**Perturbations in Cytokine Gene Expression
after Inoculation of C57BL/6 Mice with
*Pasteurella pneumotropica***

Calvin C Patten Jr, Matthew H Myles, Craig L Franklin, and Robert S Livingston

PCR vs. RT-PCR vs. qPCR

- Polymerase Chain Reaction
 - PCR: Amplifies genomic DNA
 - RT-PCR: Converts mRNA to cDNA using the Reverse Transcriptase reaction
 - qPCR: “Real Time” PCR used to quantify

The WAG/Rij Rat

- Coat color?
 - Albino

Spontaneous Coagulopathy in Inbred WAG/RijYcb Rats

Carmen J Booth,^{1*} Marjory B Brooks,² and Sara Rockwell²

The WAG/Rij Rat

- Coat color?
 - Albino
- Stock or Strain?

The WAG/Rij Rat

- Coat color?

The WAG/Rij Rat

- Coat color?
 - Albino
- Stock or Strain?
 - Inbred strain

The WAG/Rij Rat

- Coat color?
 - Albino
- Stock or Strain?
 - Inbred strain
- Originated from what stock?

The WAG/Rij Rat

- Coat color?
 - Albino
- Stock or Strain?
 - Inbred strain
- Originated from what stock?
 - Wistar
- Notable phenotype feature?
 - Early onset retinal degeneration

The WAG/Rij Rat

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The WAG/Rij Rat

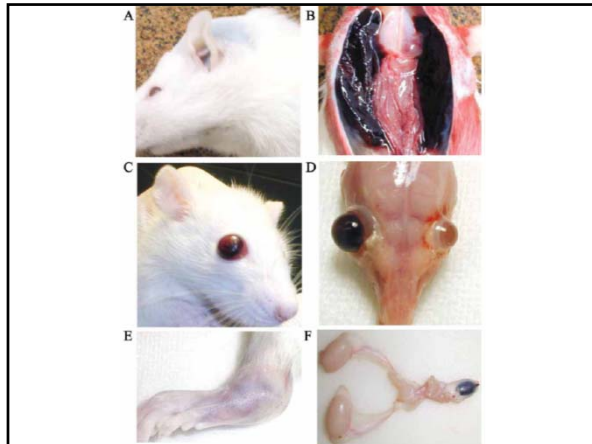
- Coat color?
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 - Early onset retinal degeneration
- Name another strain with retinal pathology

The WAG/Rij Rat

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- Stock or Strain?
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The WAG/Rij Rat

- Coat color?
 - Albino
- Stock or Strain?
 - Inbred strain
- Originated from what stock?
 - Wistar
- Notable phenotype feature?
 - Early onset retinal degeneration
- Name another strain with retinal pathology
 - The RCS rat



Escherichia coli O157:H7 Infection in Dutch Belted and New Zealand White Rabbits

Aruna Panda,¹ Ivan Tatarov,¹ Angela R Melton-Celsa,⁴ Krishnan Kolappaswamy,¹ Edwin H Kriel,¹ Daniel Petkov,¹ Turhan Coksaygan,¹ Sofie Livio,² Charles G McLeod,¹ James P Nataro,² Alison D O'Brien,⁴ and Louis J DeTella^{1,2}

Stock or Strain?

- Sprague-Dawley
- Lewis
- Long-Evans
- Fischer 344
- Wistar
- Brattleboro

E. Coli Cliff Notes

- O antigens: Cell wall
- H antigens: Flagellar
- K antigens: Secreted polysaccharides
- Flavors:
 - ETEC: Enterotoxigenic
 - EHEC: Enterohemorrhagic
 - EPEC: Enteropathogenic
 - EIEC: Enteroinvasive

Stock or Strain?

- Sprague-Dawley (Stock)
- Lewis (Strain)
- Long-Evans (Stock)
- Fischer 344 (Strain)
- Wistar (Stock)
- Brattleboro (Strain)

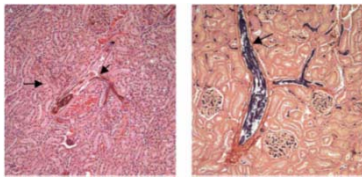
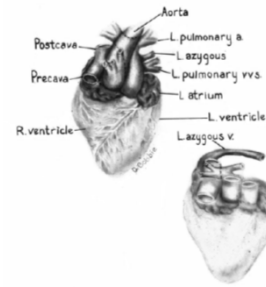
Which of the following euthanasia methods is conditionally acceptable in rabbits?:

1. Inhalant anesthetic
2. Carbon dioxide
3. Barbiturates
4. Cervical dislocation
5. Carbon monoxide

Which of the following euthanasia methods is conditionally acceptable in rabbits?:

1. Inhalant anesthetic
2. Carbon dioxide
3. Barbiturates
4. **Cervical dislocation (<1 Kg)**
5. Carbon monoxide

Take Note



- Phosphotungstic acid hematoxylin stain
 - Creates contrasts in color similar to H&E stain

What feature of the swine cardiac vasculature make it very well-suited for studies of human heart disease?

1. Coronary blood flow is predominantly left-sided
2. Coronary blood flow is predominantly right-sided
3. Collateral circulation is extensive
4. The LAD coronary artery is easily occluded
5. The left circumflex artery is easily occluded

Refinement of Pig Retroperfusion Technique: Global Retroperfusion with Ligation of the Azygos Connection Preserves Hemodynamic Function in an Acute Infarction Model in Pigs (*Sus scrofa domestica*)

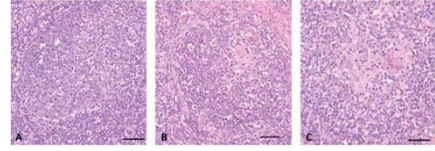
Frank Harig,¹ Evelyn Hoyer,² Dirk Labahn,³ Joachim Schmidt,⁴ Michael Weyand,⁵ and Stephan M Ensminger¹

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Infection of Cesarean-Derived Colostrum-Deprived Pigs with Porcine Circovirus Type 2 and Swine Influenza Virus

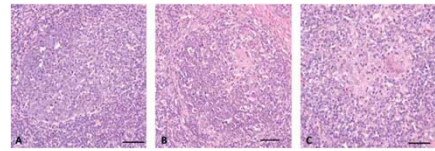
Huiling Wei, Stephen D Lenz, William G Van Alstine, Gregory W Stevenson,¹
Ingeborg M Langohr² and Roman M Pogranichny¹



- What is unique about swine lymph node morphology?

Take Note

- What families?
 - Porcine circovirus
 - Swine influenza virus



- What is unique about swine lymph node morphology?
 - Inverted cortex and medulla with germinal centers located in the medulla

Take Note

- What families?
 - Porcine circovirus
 - *Circoviridae*
 - Non-enveloped DNA
 - Swine influenza virus
 - *Orthomyxoviridae*
 - Enveloped RNA

Simian Betaretrovirus Infection in a Colony of Cynomolgus Monkeys (*Macaca fascicularis*)

Koji Fujimoto,^{1,2*} Jun-ichiro Takano,^{1,2} Toyoko Narita,¹ Koji Hanari,¹ Nobuhiro Shimozawa,² Tadashi Sankai,²
Takashi Yoshida,² Keiji Terao,² Takeshi Kurata,¹ and Yasuhiro Yasutomi¹

Retroperitoneal fibromatosis is associated with what virus?

1. Simian immunodeficiency virus
2. Simian T lymphotropic virus
3. Simian retrovirus type D1
4. Simian retrovirus type D2
5. Herpesvirus simplex 1

Other Stuff

- RT-PCR..detecting what?
 - cDNA generated from mRNA
- Western blotting...detecting what?
 - Protein

Retroperitoneal fibromatosis is associated with what virus?

1. Simian immunodeficiency virus (Lentivirus)
2. Simian T lymphotropic virus (Type C retro)
3. **Simian retrovirus type D1 (SQ)**
4. **Simian retrovirus type D2 (more common)**
5. Herpesvirus simplex 1 (Alphaherpesvirus)

Other Stuff

- RT-PCR..detecting what?
 - cDNA generated from mRNA
- Western blotting...detecting what?
 - Protein
- Northern blot detecting what?
- Southern blot detecting what?

Other Stuff

- RT-PCR..detecting what?
- Western blotting...detecting what?

A Challenge Model for *Shigella dysenteriae* 1 in Cynomolgus Monkeys (*Macaca fascicularis*)

Steven T Shipley,¹ Aruna Panda,^{1*} Abdul Q Khan,² Edwin H Kriel,¹ Milton Maciel Jr,² Sofie Livio,² James P Nataro,² Myron M Levine,² Marcelo B Szein,² and Louis J DeTolla,³

Let's Talk Shigella

- All are Gram negative, non-motile, facultative anaerobes, non-spore forming
- *S. flexneri* and *sonnei* are most common species in NHPs
- Only *S. dysenteriae* Type 1 produces Shiga toxin and not documented in NHPs

Alterations in Cytokines and Effects of Dexamethasone Immunosuppression during Subclinical Infections of Invasive *Klebsiella pneumoniae* with Hypermucoviscosity Phenotype in Rhesus (*Macaca mulatta*) and Cynomolgus (*Macaca fascicularis*) Macaques

Robin L Burke,¹ Michael W West,² Rebecca Erwin-Cohen,² Edward B Selby,³ Diana E Fisher,² and Nancy A Twenhafel¹

What Is The Eponym For The Guinea Pig Keratoconjunctivis Assay?

1. The Draize test
2. The Hogben test
3. The FETAX assay
4. The Sereny test
5. The Quellung assay

From Last Year...Comp Med 59(6)

Epidemiology of Invasive *Klebsiella pneumoniae* with Hypermucoviscosity Phenotype in a Research Colony of Nonhuman Primates

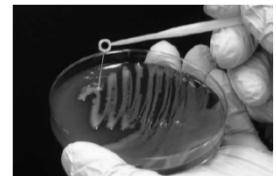
Robin L Burke,¹ Chris A Whitehouse,¹ Justin K Taylor,¹ and Edward B Selby¹

What Is The Eponym For The Guinea Pig Keratoconjunctivis Assay?

1. The Draize test (irritancy test)
2. The Hogben test (pregnancy test)
3. The FETAX assay (toxicity assay)
- 4. The Sereny test**
5. The Quellung assay (capsular assay in *S. pneumoniae*)

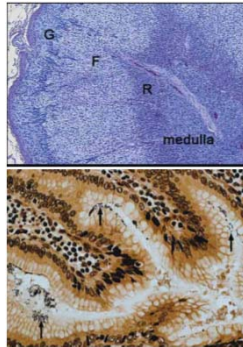
Hypermucoviscosity (HMV) Phenotype

- A 'string' of 5mm or longer is considered positive
- Tend to be very invasive



Some Eye Candy

- Adrenal gland histology
- Silver stain



Orally Ingested $^{13}\text{C}_2$ -Retinol is Incorporated into Hepatic Retinyl Esters in a Nonhuman Primate (*Macaca mulatta*) Model of Hypervitaminosis A

Anne L Escaron and Sherry A Tanumihardjo*

Special Stains Matching

- | | |
|------------------------|----------------------|
| • Warthin-Starry Stain | • For osteoclasts |
| • Lilly Twort Stain | • Tissue Gram stain |
| • Congo Red | • For tissue calcium |
| • TRAP stain | • For lipid |
| • Alizarin Red | • Mast cells |
| • Oil Red O | • Collagen |
| • Picosirius Red | • Glycogen |
| • PAS | • Silver stain |
| • Toluidine blue | • For amyloid |

Not Sure On This One

- Lots of organic and biochemistry
 - Chromatography
 - Mass spectrometry
- Lots of vitamin A metabolism
- Lots of nutrition talk

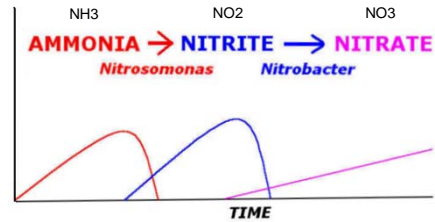
This is some bait you might cut

Special Stains Matching

- | | |
|------------------------|----------------------|
| • Warthin-Starry Stain | • For osteoclasts |
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| • PAS | • Silver stain |
| • Toluidine blue | • For amyloid |

- Gestation length of:
 - *Macaca fascicularis*?
 - *Papio anubis*?
 - *Saimiri sciureus*?
 - *Aotus nancymaae*?
 - *Callithrix jacchus*?

- Gestation length of:
 - *Macaca fascicularis*?
 - 164 days
 - *Papio anubis*?
 - 164-186 days
 - *Saimiri sciureus*?
 - 150 days
 - *Aotus nancymae*?
 - 133 days
 - *Callithrix jacchus*?
 - 148 days



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April 2010

Things to Ponder

- Name a mammalian model of spontaneous polycystic kidney disease:
- What is the function of a morpholino oligonucleotide?

Knockdown of Bicaudal C in Zebrafish (*Danio rerio*) Causes Cystic Kidneys: A Nonmammalian Model of Polycystic Kidney Disease

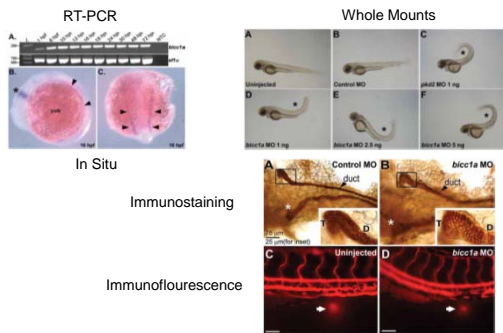
Denise J Bouvrette,¹ Vinoth Sittaramane,² Jerry R Heidel,³ Anand Chandrasekhar,² and Elizabeth C Bryda^{1*}

Things to Ponder

- Name a mammalian model of spontaneous polycystic kidney disease:
 - Persian cat
- What is the function of a morpholino oligonucleotide?
 - To sterically hinder gene expression (aka knock down gene expression)

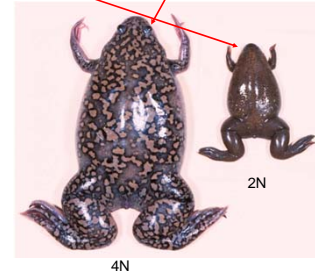


Lots of Images



X. tropicalis and *laevis*

- Which is which?
- To what family do they belong:
 - Pipidae
- Tell me about ploidy in each



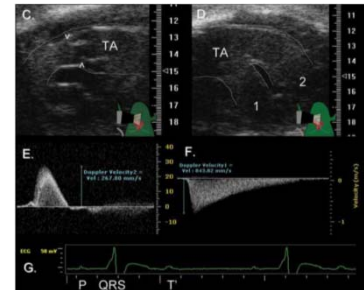
Echocardiographic Assessment of Cardiac Morphology and Function in *Xenopus*

Heather L Bartlett,¹ Robert B Escalera, II,¹ Sonali S Patel,¹ Elena W Wedemeyer,¹ Kenneth A Volk,¹ Jamie L Lohr,² and Benjamin E Reinking¹

2 Dimensional Echo

Doppler

ECG



X. tropicalis and *laevis*

- Which is which?
- To what family do they belong:
- Tell me about ploidy in each



Pathogenicity of *Aeromonas hydrophila*, *Klebsiella pneumoniae*, and *Proteus mirabilis* to Brown Tree Frogs (*Litoria ewingii*)

Ermin Schädich¹ and Anthony LJ Cole

Take Note

- “Skin antimicrobial peptides” mentioned...and that’s about it

The t(14,15) in Mouse Strain *CBA/CaH-T(14;15)6Ca/J* Causes a Break in the *ADAMTS12* Gene

Bengi Acar-Perk,¹ Karen Bräutigam,² Regina Grunewald,¹ Andreas Schmutzler,¹ Christian Schem,¹ Norbert K Arnold,¹ Walter Jonat,¹ and Jörg Weimer^{1*}

The condition shown is most likely the result of administration of which anesthetic agent:

1. Tribromoethanol
2. Chloral hydrate
3. Alpha chloralose
4. Dexmedetomidine
5. Xylazine



Dissect This

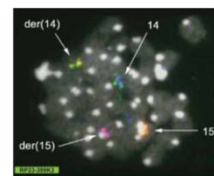
CBA/CaH-T(14;15)6Ca/J

The condition shown is most likely the result of administration of which anesthetic agent:

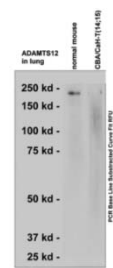
1. Tribromoethanol
2. **Chloral hydrate**
3. Alpha chloralose
4. Dexmedetomidine
5. Xylazine



Some Eye Candy



FISH



Western Blot

Experimental Infection of Mice with Hamster Parvovirus: Evidence for Interspecies Transmission of Mouse Parvovirus 3

Rachel D Christie, Emily C Marcus, April M Wagner, and David G Besselsen*

Guinea Pig Adenovirus Infection Does Not Inhibit Cochlear Transfection with Human Adenoviral Vectors in a Model of Hearing Loss

F Claire Hankenson,^{1*} Asheley B Wathen,^{2*} Kathryn A Eaton,² Toru Miyazawa,² Donald L Swiderski,¹ and Yehoash Raphael¹

The presence of which protein is indicative of active parvovirus infection?

1. NS1
2. VP1
3. MusM1
4. VP2
5. H1N1

Riddle Me This...

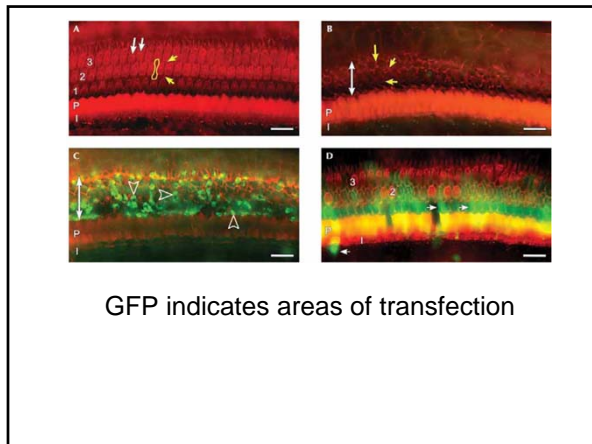
- What are some standard deafening agents used in guinea pigs?
- What reflex is used to assess hearing function?
- What do you know about green fluorescent protein?

The presence of which protein is indicative of active parvovirus infection?

1. **NS1**
2. VP1(Capsid protein)
3. MusM1
4. VP2 (Capsid protein)
5. H1N1

Riddle Me This...

- What are some standard deafening agents used in guinea pigs?
 - Aminoglycosides
 - NOTE: Kanamycin and ethacrynic acid synergistic
- What reflex is used to assess hearing function?
 - Preyer reflex
- What do you know about green fluorescent protein?
 - Typically used as marker
 - Bioluminescent protein from *Aequorea victoria*



Name That Pig

- Sinclair
- Yucatan
- Gottingen
- Ossabaw

Expression Profiles of miRNA-122 and Its Target *CAT1* in Minipigs (*Sus scrofa*) Fed a High-Cholesterol Diet

Susanna Cirera,^{1*} Malene Birck,² Peter K Busk,^{3*} and Merete Fredholm¹

Which of the following is a model for Type II diabetes mellitus?

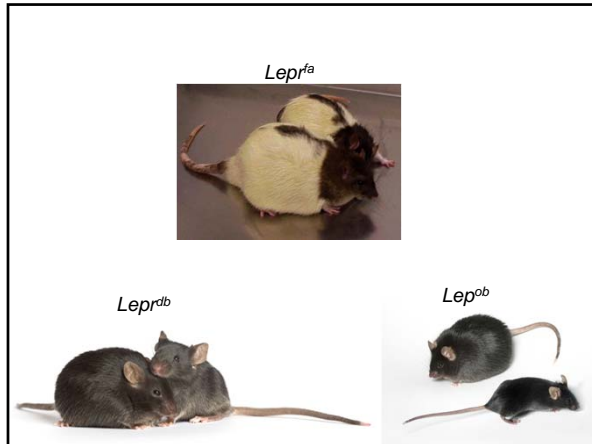
1. Alloxan-induced diabetes
2. Streptozotocin-induced diabetes
3. Mice with a mutation in the *Lepr* gene
4. Mice with a mutation in the *Lep* gene
5. The NOD mouse

Name That Pig

- Sinclair
- Yucatan
- Gottingen
- Ossabaw

Which of the following is a model for Type II diabetes mellitus?

1. Alloxan-induced diabetes (Type I DM)
2. Streptozotocin-induced diabetes (Type I DM)
3. **Mice with a mutation in the *Lepr* gene**
4. **Mice with a mutation in the *Lep* gene**
5. The NOD mouse (Type I DM)



Hypocitraturia in Common Bottlenose Dolphins (*Tursiops truncatus*): Assessing a Potential Risk Factor for Urate Nephrolithiasis

Stephanie K Venn-Watson,^{1,2} Forrest I Townsend,³ Risa L Daniels,¹ Jay C Sweeney,⁴ Jim W McBain,² Leigh J Klatsky,⁴ Christie L Hicks,¹ Lydia A Staggs,⁴ Teri K Rowles,¹ Lori H Schwacke,⁴ Randall S Wells,² and Cynthia R Smith¹

Light Microscopic, Electron Microscopic, and Immunohistochemical Comparison of Bama Minipig (*Sus scrofa domestica*) and Human Skin

Yu Liu,¹ Jun-ying Chen,¹ Hai-tao Shang,¹ Chang-e Liu,¹ Yong Wang,¹ Rong Niu,¹ Jun Wu,² and Hong Wei^{1,2}

Some AWA Tidbits

- *Tursiops truncatus* is a Class I cetacean
- Minimum horizontal distance (MHD) is the diameter of a circular pool or diameter of largest circle that can fit in a non-circular pool
- Regulations specify MHD, depth, and surface area
- Pinnipeds, polar bears, and sea otters all require dry resting areas
- Cetaceans and sirenians can be pools only

SEM or TEM?

Method Used?

Use of Biomarkers of Collagen Types I and III Fibrosis Metabolism to Detect Cardiovascular and Renal Disease in Chimpanzees (*Pan troglodytes*)


John J Ely,^{1,2} Micah A Bishop,² Michael L Lamme,¹ Meg M Sleeper,³ Jörg M Steiner,² and D Rick Lee¹

Comp Med 60(3)

June 2010

What is the device shown?

1. Hot plate
2. Operant chamber
3. Metabolic cage
4. Acoustic startle chamber
5. Light-dark chamber




**Animal Models of Substance Abuse and Addiction:
Implications for Science, Animal Welfare,
and Society**

Wendy J Lynch,¹ Katherine L Nicholson,² Mario E Dance,⁴ Richard W Morgan,¹ and Patricia L Foley^{2*}

What is the device shown?


1. Hot plate
2. **Operant chamber**
3. Metabolic cage
4. Acoustic startle chamber
5. Light-dark chamber



Acquisition	The process by which a new behavior, such as lever pressing for drug deliveries, is added to the organism's behavioral repertoire.
Addiction	A chronic, relapsing brain disease that is characterized by compulsive drug seeking and use, despite harmful consequences.
Choice procedure	The allocation of one of 2 or more alternative, usually incompatible, responses.
Fixed ratio schedule	A schedule in which a response is reinforced only after the animal has responded a specified number of times. For example, with a fixed-ratio 5 schedule of reinforcement, responding is reinforced after every 5 responses.
Operant behavior	Emitted behavior that can be modified by its consequences (also termed instrumental behavior). This class of behavior is often referred to as purposeful or voluntary.
Progressive-ratio schedule	A higher-order schedule that requires the animal to emit an increasing number of responses for each successive reinforcer. For example, at the start of the session, the animal may be required to lever press once to receive a drug delivery, twice for the second drug delivery, 4 times for the third, 8 times for the fourth, and so on.
Reinforcement	The process whereby a behavior is strengthened by the event that follows the behavior, and a procedure by which the contingencies between the reinforcers and behavior are arranged within a paradigm.
Reinforcer	A stimulus event that strengthens the behavior that follows it.
Reinforcing efficacy	The likelihood that a drug will serve as a reinforcer under various experimental conditions (also termed reinforcing strength). For example, a drug that is only self-administered when the work requirement to obtain a delivery is low (that is, fixed-ratio 1) would be considered a weak reinforcer, whereas a drug that is self-administered under a variety of different experimental conditions and when the work requirement is high would be considered a strong reinforcer.
Reinstatement paradigm	A model of relapse whereby the animal is tested on responding on a lever that was formerly associated with the drug following exposure to a small priming dose of the drug or the environmental stimuli associated with the drug. Stress also is often used as a trigger for drug-seeking behavior during reinstatement testing.
Second (or higher)-order schedule	A schedule requiring the completion of an individual component of the schedule that produces availability to the terminal event. A second schedule of reinforcement must then be completed to produce the terminal event. For example, under a second-order fixed-ratio 10 (that is, fixed interval of 10 s) schedule of reinforcement, 10 successive fixed-interval schedules would have to be completed before a response is reinforced.
Self-administration	Operant responding that directly produces administration of the drug.

Figure 1. A glossary of some terms used in studying drug reinforcement. Based on information in reference 71.

Hot plate
Metabolic cage
Acoustic startle chamber
Light-dark chamber



Effects of Murine Norovirus Infection on a Mouse Model of Diet-Induced Obesity and Insulin Resistance

Jisun Paik, Yvette Fierce, Rolf Drivdahl, Piper M Treuting, Audrey Seamons, Thea Brabb, and Lillian Maggio-Price*

Open, Closed, Fixed

- Open formula
 - Each ingredient and concentration is openly declared
- Closed formula
 - Exact formulation is not disclosed; only ingredients are disclosed
- Fixed formula
 - Each ingredient always used in fixed amount

2014S
Teklad Global 14% Protein Rodent Maintenance Diet (Sterilizable)



Product Description—Teklad Global 14% Protein Rodent Maintenance Diet (Sterilizable) is designed and manufactured with the same high quality ingredients in both the United States and throughout Europe. 2014S is a **Fixed Formula** diet containing 14% protein and 3.3% fat. Scientific publications report that low fat, low protein diets promote longevity and normal body weight in rodents. 2014S does not contain aflatoxin or soybean meal, thus minimizing the occurrence of natural phytoestrogens. Absence of animal proteins and fish meal eliminates the presence of contaminants. 2014S is a balanced diet supplemented with additional vitamins to ensure nutritional adequacy after autoclaving. All Harlan Teklad Global Diets® are available certified.

Ingredients—Wheat middlings, ground wheat, ground corn, corn gluten meal, calcium carbonate, soybean oil, dicalcium phosphate, iodized salt, L-lysine, DL-methionine, choline chloride, thiamine mononitrate, biotin, niacin, vitamin A acetate, pyridoxine hydrochloride, vitamin D₃ supplement, fish oil, menadione sodium bisulfite complex, source of vitamin K activity, calcium pantothenate, vitamin E supplement, vitamin B₆ supplement, riboflavin, inositol, ferrous sulfate, magnesium oxide, manganese oxide, zinc oxide, copper sulfate, calcium sulfate, cobalt carbonate, chromium potassium sulfate.

Diet Used in Study

AIN93M

INGREDIENTS (%)	
Corn Starch	46.5692
Dextrin	15.5000
Casein - Vitamin Free	14.0000
Sucrose	10.0000
Powdered Cellulose	5.0000
Soybean Oil	4.0000
AIN 93M Mineral Mix	3.5000
AIN 93 Vitamin Mix	1.0000
Choline Bitartrate	0.2500
L-Cystine	0.1800
t-Butylhydroquinone	0.0008

How would you classify this diet?

Natural vs. Purified vs. Chemically Defined

- Natural Ingredient
 - Most common diet
 - Composed of cereal grains with some refined materials (e.g. bone meal)
 - Disadvantages
 - Variability in nutrient composition from batch to batch
 - Contaminants, estrogenic compounds
 - Reduced nutrient bioavailability

Classifying Diets:

- Ingredients
 - Natural-ingredient
 - Purified
 - Chemically-defined
- Labeling/Consistency
 - Open formula
 - Closed formula
 - Fixed formula
- Physical form
 - Pelleted
 - Extruded
 - Meal
 - Crumbled
 - Liquid
- Sterilized
 - Autoclaved
 - Irradiated
- Certified diets

Natural vs. Purified vs. Chemically Defined

- Purified
 - Formulated from set of refined, invariant ingredients such as casein
 - AIN and NIH diets
 - AIN-93(G or M) most commonly used presently
- Chemically defined
 - Formulated with analytical-grade components
 - Amino acids, triglycerides etc.
 - Not very commonly used

Disadvantage of both is diminished shelf life

Atherogenic Diets

- Western diet and Paigen diet
 - High fat to promote atherosclerosis
 - Increased cholesterol plus sodium cholate in Paigen diet

Selected Nutrient Information ¹		
	% by weight	% kcal from
Protein	17.3	15.2
Carbohydrate	48.5	42.7
Fat	21.2	42.0



What does this signify?
Irradiated diet
Symbol=radura



Certified Diets

- Certified to be free of contaminants
- Mandatory for GLP studies

Contaminant	Maximum Acceptable Limit			
	Feed ¹	Crude Fat	Lab Chg	Female
Arsenic	0.00	0.00	0.00	0.00
Cadmium	0.00	0.00	0.00	0.00
CdE	0.00	0.00	0.00	0.00
Mercury	0.20	0.20	0.20	0.20
Selenium	0.00	0.00	0.00	0.00
Aluminum	1.00	1.00	1.00	1.00
AgNi	0.00	0.00	0.00	0.00
Debris	0.00	0.00	0.00	0.00
BBPE	0.00	0.00	0.00	0.00
Hexachlor	0.00	0.00	0.00	0.00
Dieldrin	0.00	0.00	0.00	0.00
Chlordane	0.00	0.00	0.00	0.00
OCF/MSD Substances	0.10	0.10	0.10	0.10
PCB	0.15	0.15	0.15	0.15
Hexachlor Epoxide	0.00	0.00	0.00	0.00
Dioxin	0.15	0.15	0.15	0.15
BBFC	0.00	0.00	0.00	0.00
o-PPE	0.00	0.00	0.00	0.00
p-PPE	0.00	0.00	0.00	0.00
Hexachlorobenzene	0.00	0.00	0.00	0.00
Allyl	0.00	0.00	0.00	0.00
Methoxychlor	0.00	0.00	0.00	0.00
BHC	0.00	0.00	0.00	0.00
Dieldrin	0.00	0.00	0.00	0.00
Heptachlor	0.00	0.00	0.00	0.00
DDT	0.00	0.00	0.00	0.00
Endrin	0.00	0.00	0.00	0.00
Chlordane	0.00	0.00	0.00	0.00
Allyl	0.00	0.00	0.00	0.00

¹ Contaminants listed in parts per million (ppm) ² 100 times in parts per billion

Male CD81 Knockout Genotype Disrupts Mendelian Distribution of Offspring

Whitney J Mordica, Ryan J Gallagher,¹ Jenna L Kennedy,¹ and Stephen K Chapes²

What does this signify?



Some Mouse Genetics and Nomenclature

- What can you tell me about:

C.129-Cd81^{tm1N7}
and
C.C3-Tlr4^{Lpsd/J}

Some Mouse Genetics and Nomenclature

- How many backcrosses?
- What if it were C;129-*Cd81^{tm1N7}*?
- What if it were C.129-Tg(Cd81)?
- What strain would be coisogenic to C3-*Tlr4^{Lpsd/J}*?
- What would be a good control strain for C.C3-*Tlr4^{Lpsd/J}*?

Cellular Compensatory Mechanisms in the CNS of Dysmyelinated Rats

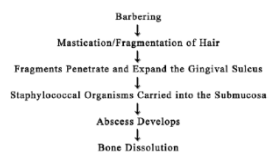
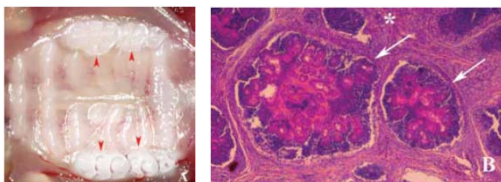
Jack M Kwiecien

Etiopathogenesis of Mandibulofacial and Maxillofacial Abscesses in Mice

Gregory W Lawson

Immunization of mice with myelin basic protein to induce experimental autoimmune encephalomyelitis (EAE) is used to model what disease?

1. Amyotrophic lateral sclerosis
2. Multiple sclerosis
3. Spinal muscular dystrophy
4. Duchenne muscular dystrophy
5. Cerebral palsy

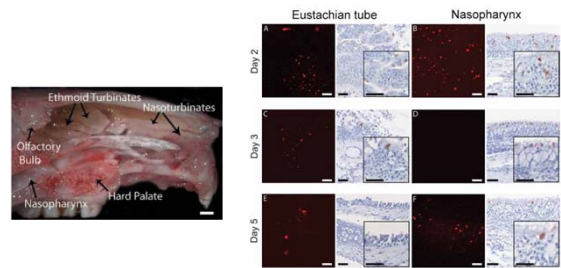


Immunization of mice with myelin basic protein to induce experimental autoimmune encephalomyelitis (EAE) is used to model what disease?

1. Amyotrophic lateral sclerosis
2. **Multiple sclerosis**
3. Spinal muscular dystrophy
4. Duchenne muscular dystrophy
5. Cerebral palsy

Development and Characterization of a Rat Model of Nonpenetrating Liver Trauma

Jennifer M Cox and John E Kalns*



I'm Afraid I Got Nothin'

Which of the following has been shown to be a good model of paramyxovirus infections?:

1. *Sigidon hispidus*
2. *Chinchilla lanigera*
3. *Oryzomys palustris*
4. *Meriones unguiculatus*
5. *Mastomys natalensis*

Mapping the Anatomy of Respiratory Syncytial Virus Infection of the Upper Airways in Chinchillas (*Chinchilla lanigera*)

Jessica L Grieves,^{1,2} Joseph A Jurcisek,¹ Brian Quist,¹ Russell K Durbin,³ Mark E Peoples,² Joan E Durbin,³ and Lauren O Bakaletz^{1,4}

Which of the following has been shown to be a good model of paramyxovirus infections?:

1. ***Sigidon hispidus* (cotton rat)**
2. *Chinchilla lanigera* (chinchilla)
3. *Oryzomys palustris* (rice rat)
4. *Meriones unguiculatus* (mongolian gerbil)
5. *Mastomys natalensis* (multimammate rat)

Comparison of Lactate, Base Excess, Bicarbonate, and pH as Predictors of Mortality after Severe Trauma in Rhesus Macaques (*Macaca mulatta*)

Theodore R Hobbs,¹ Jean P O'Malley, Samone Khouangathiene, and Christopher J Dubay

Considerations for the Use of Anesthetics in Neurotoxicity Studies

Sumedha W Karmarkar,¹ Kathleen M Bottum,² and Shelley A Tischkau^{1*}

????

Take Note

- Isoflurane
 - NMDAR antagonist
 - GABA agonist
- Dexmedetomidine
 - Alpha 2 agonist
- Propofol
 - NMDAR
 - GABA agonist
- Ketamine
 - NMDAR antagonist
- Barbiturates
 - GABA agonist
- Halothane
 - NMDAR mediated
- Xenon
 - NMDAR antagonist
- CO2
 - Not clear
- N2O
 - NMDAR antagonist

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August 2010

Quantitation of Acute Phase Proteins and Protein Electrophoresis in Monitoring the Acute Inflammatory Process in Experimentally and Naturally Infected Mice

Carolyn Cray,^{1*} David G Besselsen,² Jody L Hart,³ David Yoon,^{1,2} Marilyn Rodriguez,¹ Julia Zales,^{1,2} and Norman H Altman¹

Take Note

- Sendai virus
- Complete Freund's Adjuvant
- 2, 2, 2, tribromoethanol
- Enzyme Linked Immunosorbent Assay

Lack of Association of a Spontaneous Mutation of the *Chrm2* Gene with Behavioral and Physiologic Phenotypic Differences in Inbred Mice

Ming Ding,¹ Jennifer Arnold,¹ Jeremy Turner,^{2,3} Vickram Ramkumar,¹ Larry F Hughes,² Rita A Trammell,¹ and Linda A Toth^{1,2*}

Take Note

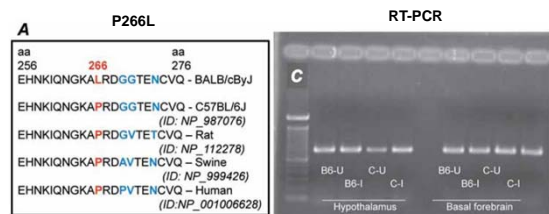
- Sendai virus
 - Family of virus?
- Complete Freund's Adjuvant
 - Type of adjuvant?
- 2, 2, 2, tribromoethanol
 - 2 degradation products
- Enzyme Linked Immunosorbent Assay
 - What is being measured?

What Are These?



Take Note

- Sendai virus
 - Paramyxoviridae
- Complete Freund's Adjuvant
 - Water-in-oil, depot forming
- 2, 2, 2, tribromoethanol
 - HBR and dibromoacetaldehyde
- Enzyme Linked Immunosorbent Assay
 - Can detect antigen or antibody



**Insulin-Induced Hypoglycemic Peripheral
Motor Neuropathy in Spontaneously
Diabetic WBN/Kob Rats**

Kiyokazu Ozaki,* Tomoya Sano, Naho Tsuji, Tetsuro Matsuura, and Isao Narama

Which of the following rat stocks/strains develops spontaneous Type 1 diabetes mellitus?

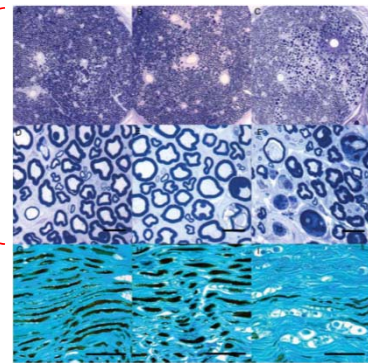
1. Long-Evans
2. Long-Evans cinnamon
3. Gunn
4. Zucker fatty (Type 2)
5. **Wistar Bonn Kobori**

**Bonus: Name rat strain that develops Type 1 DM
BB (Bio-Breeding) rat**

Which of the following rat stocks/strains develops spontaneous Type 1 diabetes mellitus?

1. Long-Evans
2. Long-Evans cinnamon
3. Gunn
4. Zucker fatty
5. **Wistar Bonn Kobori**

Toluidine Blue



Luxol Fast
and IHC

Which of the following rat stocks/strains develops spontaneous Type 1 diabetes mellitus?

1. Long-Evans
2. Long-Evans cinnamon (copper storage)
3. Gunn (Crigler-Najjar syndrome)
4. Zucker fatty (Type 2)
5. **Wistar Bonn Kobori**

Bonus: Name rat strain that develops Type 1 DM

**Spatiotemporal Expression of *tmie* in the Inner Ear
of Rats during Postnatal Development**

Mi Jung Shin,¹ Jeong-Han Lee,² Dong Hoon Yu,¹ Hye Jung Kim,¹ Ki Broom Bae,¹ Hyung Soo Yuh,¹ Myoung Ok Kim,¹
Byung-Hwa Hyun,¹ Sanggyu Lee,¹ Raekil Park,² and Zae Young Ryoo¹

It's *tmie* Time

- The 'spinner (*sr*)' and 'circling (*cr*)' mutations exist in mice
 - How to properly denote that mutation?
 - How to denote a 'knock out'?
 - How to denote a spontaneous mutation?
 - How to denote a transgenic insertion?
 - How to indicate backcrossing onto a different strain?

Blood Supply to the Chicken Femoral Head

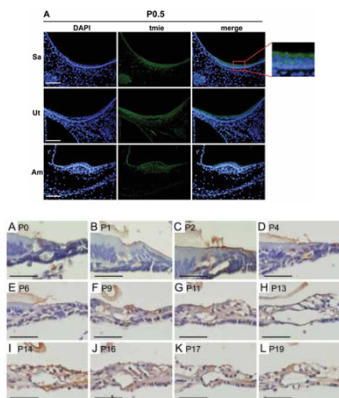
Jianzhong Xu, Xiuli Wang, C Brian Toney, Jesse Seamon, and Qianjun Cui

It's *tmie* Time

- The 'spinner (*sr*)' and 'circling (*cr*)' mutations exist in mice
 - How to properly denote that mutation?
 - *tmie^{sr}* and *tmie^{cr}*
 - How to denote a 'knock out'?
 - C57BL/6J-*tmie^{tm1Unc}*
 - How to denote a spontaneous mutation?
 - C57BL/6J-*Tmie^{sr}/J*
 - How to denote a transgenic insertion?
 - C57BL/6-Tg(*tmie*)/J
 - How to indicate backcrossing onto a different strain?
 - 129.B6-*tmie^{sr}/J*

The Guide

- Floor space (feet squared)
 - Pigeons: 0.8
 - Quail: 0.25
 - Chickens: 0.25-3.0
- Height
 - "Sufficient for animals to stand erect with feet on the floor"
- Temperature
 - Dry bulb 61-81 °F for "poultry"



Chicken Models of Disease

- Hashimoto's thyroiditis
 - Cornell Obese Strain (OS)
- Sex-linked dwarfism
 - *dw* mutation in *GHR* gene
- Muscular dystrophy
 - Single gene mutation
- Atherosclerosis
 - Lesions first in thoracic aorta



Metabolic Syndrome and Coronary Artery Disease in Ossabaw Compared with Yucatan Swine

Zachary P Neeb, Jason M Edwards, Mouhamad Allooshi, Xin Long, Eric A Mokolke, and Michael Sturek

Comp Med 60 (5)

October 2010

Take Note

- The Ossabaw Swine
 - Native to Ossabaw Island
 - Develop metabolic syndrome



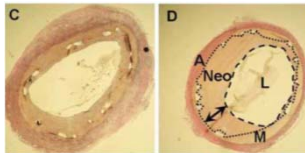
Table 2. Comparison of MetS (items 1 through 6) in Yucatan (Y) and Ossabaw (O) miniature swine, utility as cardiovascular disease models (items 7 and 8), and cellular or molecular characteristics (items 9 through 12)

Characteristic	Yucatan	Ossabaw	References
1. Obesity	No	O>Y	4, 8, 9, 16, 20, 52, 83, 95; Table 1; Figure 1
2. Insulin resistance	No	Yes	16, 19, 52, 68, 83, 96; Figure 2
3. Glucose intolerance (or impaired glucose tolerance)	No	Yes	4, 8, 9, 15, 16, 19, 52, 62, 68, 83, 95, 96; Figure 2
4. Dyslipidemia (increased LDL, HDL or LDL:total cholesterol)	Yes	Yes	9, 15, 16, 19, 51, 52, 77, 83, 96; Table 1
5. Dyslipidemia (increased triglycerides)	No	Yes	9, 15, 16, 19, 24, 52, 62, 77, 83, 95, 96
6. Hypertension	No	Yes	9, 16, 19, 68, 80, 83

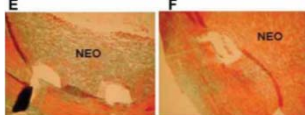
Variation in the Gut Microbiota of Laboratory Mice Is Related to Both Genetic and Environmental Factors

Majbritt Ravn Hufeldt,^{1,2,3} Dennis S Nielsen,² Finn Kvist Vogensen,² Tore Midtved,⁴ and Axel Kørnerup Hansen^{1*}

- Verhoeff-Van Gieson stain



- Masson's trichrome stain



A germ-free mouse that receives Schaedler's 'cocktail' would best be described as:

1. Specific pathogen free
2. Axenic
3. Gnotobiotic
4. Abiotic
5. Xenobiotic

A germ-free mouse that receives Schaedler's 'cocktail' would best be described as:

1. Specific pathogen free
2. Axenic
3. **Gnotobiotic**
4. Abiotic
5. Xenobiotic

Hood-Not A Hood

- Long-Evans Cinnamon
- Brattleboro
- Sprague-Dawley
- RCS
- Zucker
- Copenhagen
- Lewis
- Wistar
- Buffalo
- Fischer
- August

Endpoints in Myelin-Deficient (*md*) Rats

Jack M Kwiecien^{1,2} and Kathleen H Delaney³

Hood-Not A Hood

- **Long-Evans Cinnamon**
- **Brattleboro**
- Sprague-Dawley
- **RCS**
- **Zucker**
- **Copenhagen**
- Lewis
- Wistar
- Buffalo
- Fischer
- **August**

Long-Evans Shaker Rat

- Exhibit dysmyelination
- Hindlimb paralysis from 5-15 weeks of age

Dark-Phase Light Contamination Disrupts Circadian Rhythms in Plasma Measures of Endocrine Physiology and Metabolism in Rats

Robert T Dauchy,¹ Erin M Dauchy,³ Robert P Tirrell,² Cody R Hill,¹ Leslie K Davidson,² Michael W Greene,¹ Paul C Tirrell,² Jinghai Wu,² Leonard A Sauer,² and David E Blasko¹

According to The Guide the light intensity for animals susceptible to phototoxic retinopathy should range from:

1. 50-120 lux
2. 120-150 lux
3. 130-325 lux
4. 230-425 lux
5. 330-525 lux

Take Note

- Chronic, progressive nephropathy of aged rats
- Models of hypertension
 - Goldblatt kidney clamp
 - SHR, SHROB, SHRSP, SHHF rat
 - Dahl/SS

According to The Guide the light intensity for animals susceptible to phototoxic retinopathy should range from:

1. 50-120 lux
2. 120-150 lux
- 3. 130-325 lux**
4. 230-425 lux
5. 330-525 lux

A Nonlethal Young Domesticated Ferret (*Mustela putorius furo*) Model for Studying Pandemic Influenza Virus A/California/04/2009 (H1N1)

John A Lednicky,¹ Claire R Crutch,¹ Sandra J Lawrence,¹ Sara B Hamilton,¹ Deirdre E Daniels,¹ and Barry Astorff¹

Left Ventricular Hypertrophy is Prevalent in Sprague-Dawley Rats

Ryan M McAdams,¹ Ronald J McPherson, Nazila M Dabestani, Christine A Gleason, and Sandra E Juul

What Do You Know About:

- Influenza virus?
- ABSL3 requirements?
- The fabulous ferret?
- Hemagglutination inhibition assay?

Small Intestinal Permeability and Serum Folate and Cobalamin Absorption after Surgical Construction of Permanent Jejunal Fistulas in Laboratory Beagle Dogs

Rafael Frias,^{1,2} Jaana Harmoinen,² Outi Laitinen-Vapaavuori,² Thomas Spillmann,² Satu Sankari,² and Elias Westermarck²

- Painful Procedure
 - Any procedure that would reasonably be expected to cause more than slight or momentary pain or distress in a human being...
- Major Operative Procedure
 - Any surgical intervention that penetrates and exposes a body cavity or any procedure which produces **permanent** impairment of physical or physiological functions
 - The Guides states “**substantial**” impairment



This dog underwent an intestinal anastomosis. According to The AWA, this dog experienced:

1. A painful procedure
2. A non-major operative procedure
3. A major operative procedure
4. A survival procedure
5. A routine veterinary procedure

Morphometric Comparison of the Lumbar Cancellous Bone of Sheep, Deer, and Humans

Yang Wang,^{1,2} Guomin Liu,² Ting Li,² Yanlong Xiao,³ Qing Han,² Randong Xu,² and Youqiong Li^{1*}



This dog underwent an intestinal anastomosis. According to The AWA, this dog experienced:

1. **A painful procedure**
2. A non-major operative procedure
3. **A major operative procedure**
4. **A survival procedure**
5. **A routine veterinary procedure**

According to the BMBL, which of the following are recommended for decontaminating equipment following work with prions?:

1. Steam autoclave
2. 70% ethanol
3. 1:10 bleach dilution
4. Chlorhexidine
5. 2N Sodium hydroxide

According to the BMBL, which of the following are recommended for decontaminating equipment following work with prions?:

1. **Steam autoclave**
2. 70% ethanol
3. **1:10 bleach dilution**
4. Chlorhexidine
5. **2N Sodium hydroxide**

Remember a Few Factoids

- M. fascicularis = _____
- They are/aren't seasonal breeders
- Menstrual cycle is _____ days
- Gestation is _____ days

Experimental Induction of Reduced Ovarian Reserve in a Nonhuman Primate Model (*Macaca fascicularis*)

Susan E. Appel,¹ Thomas B. Clarkson,¹ Patricia B. Hoyer,² Nancy D. Kock,¹ Amanda K. Gonde,¹ M. Christina May,¹ Joseph T. Persyn,¹ Neal K. Vail,⁴ Kelly F. Ethun,² Haiying Chen,² Nivedita Sen,² and Jay R. Kaplan¹

Remember a Few Factoids

- M. fascicularis = *Cynomolgus macaque*
- They are aren't seasonal breeders
- Menstrual cycle is 28 days
- Gestation is 160-170 days

Way Back in Issue 1....

7,12-Dimethylbenz[A]Anthracene Induces Sertoli-Leydig-Cell Tumors in the Follicle-Depleted Ovaries of Mice Treated with 4-Vinylcyclohexene Diepoxide

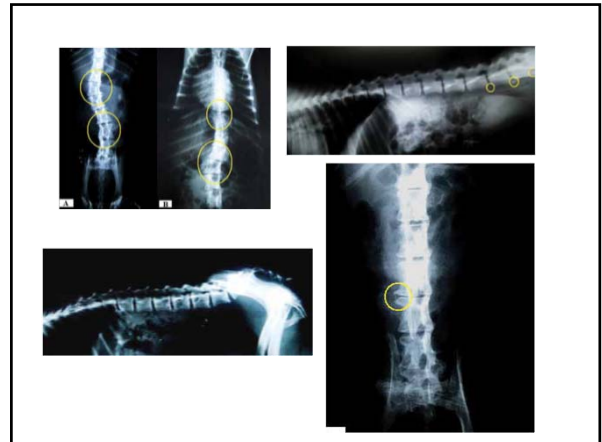
Zelieann R. Craig,¹ John R. Davis,² Samuel L. Marion,³ Jennifer K. Barton,⁴ and Patricia B. Hoyer¹

Thoracic Radiography as a Refinement Methodology for the Study of H1N1 Influenza in Cynomolgus Macaques (*Macaca fascicularis*)

Douglas L. Brining,¹ John S. Mattoon,² Lisa Kerchez,³ Rachael A. LaCasse,¹ David Safronetz,² Heinz Feldmann,² and Michael J. Parnell¹

Note The 3 Rs

- Moving from a cat model to a frog model is considered _____
- Moving from a cat model to an in vitro assay is considered _____
- This study is considered a _____
- Reducing variance in the study so fewer animals are used is considered _____



Note The 3 Rs

- Moving from a cat model to a frog model is considered replacement (relative)
- Moving from a cat model to an in vitro assay is considered replacement (absolute)
- This study is considered a refinement
- Reducing variance in the study so fewer animals are used is considered reduction

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December 2010

Radiographic Incidence of Spinal Osteopathologies in Captive Rhesus Monkeys (*Macaca mulatta*)

Braulio Hernández-Godínez,^{1,2} Alejandra Ibáñez-Contreras,^{1,2} Gerardo Perdigón-Castañeda,³ Alfonso Galván-Montaño,⁴ Guadalupe García-Montes de Oca,⁵ Carinthia Zapata-Valdez,¹ and Eduardo Tena-Betancourt⁶

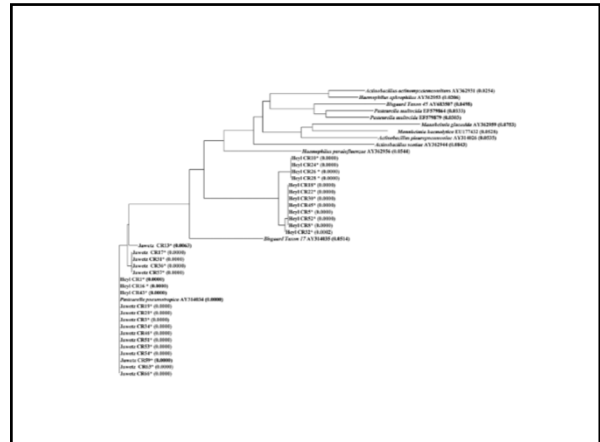
Inbred and Outbred Mice Have Equivalent Variability in a Cockroach Allergen-Induced Model of Asthma

Louis J Yaikus, Jacqueline Bouchard, Jiyoun Kim, Sudha Natarajan, and Daniel G Remick^{*}



• What is the genus and species of the organism shown above?

1. *Caenorhabditis elegans*
2. *Drosophila melanogaster*
3. *Aplysia californica*
4. *Blatella germanica*
5. *Dasympus novemcinctus*



• What is the genus and species of the organism shown above?

1. *Caenorhabditis elegans* (nematode)
2. *Drosophila melanogaster* (fruit fly)
3. *Aplysia californica* (sea hare)
4. ***Blatella germanica***
5. *Dasympus novemcinctus* (9-banded armadillo)

Pharmacologic Characteristics of Bladder Micturition Function in Anesthetized Mice

Jian Zhou, Guo-Dong Luan, Lei-Ming Ren, Zhi-Gang Wu, Xue Wang, and Yan Zhao

Assessment of *rpoB* and *16S rRNA* Genes as Targets for PCR-Based Identification of *Pasteurella pneumotropica*

Vandana S Dole,¹ Laila A Banu,² Richard D Fister,² Werner Nicklas,³ and Kenneth S Henderson¹

- Tell me about the gross anatomy of the mouse prostate gland.
- What are the other accessory sex glands in the male mouse?
- Name two prominent mouse models of prostate cancer.

- Tell me about the gross anatomy of the mouse prostate gland.
 - 4 Lobes: Anterior, dorsal, lateral, ventral
- What are the other accessory sex glands in the male mouse?
 - Seminal vesicle, ampullary gland, bulbourethral gland, preputial gland
- Name two prominent mouse models of prostate cancer.
 - LADY and TRAMP

When using ultraviolet light to sterilize surfaces it is best to avoid the use of what in the same area?

1. Phosphorylated agents
2. Ammonia-containing agents
3. Anionic detergents
4. Chlorinated compounds
5. Phenolic compounds

Electrocardiography as a Tool for
Validating Myocardial Ischemia-Reperfusion
Procedures in Mice

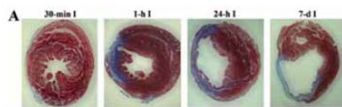
Mihai B Preda and Alexandrina Burlacu¹

When using ultraviolet light to sterilize surfaces it is best to avoid the use of what in the same area?

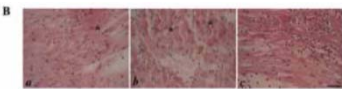
1. Phosphorylated agents
2. Ammonia-containing agents
3. Anionic detergents
4. **Chlorinated compounds** (phosgene gas a hazard)
5. Phenolic compounds

Note...

Evans Blue Dye



Masson's Trichrome

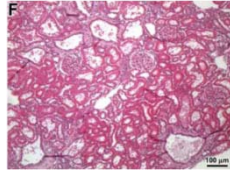


Urinary Biomarkers for Monitoring Disease
Progression in the Han:SPRD-cy Rat Model of
Autosomal-Dominant Polycystic Kidney Disease

Charles E Wiedmeyer¹ and Angela B Royal²

Take Note

- The Han:SPRD-cy rat model
 - Mutation in Sprague-Dawley rats
 - Autosomal dominant “Cy” mutation in *Anks6* gene



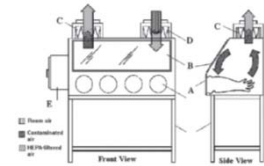
Bacillus anthracis

- Gram-positive spore forming bacteria
- Select agent
 - Register with CDC or USDA depending on type of research (‘overlap’ agent)
- Follow BSL-2 or 3 precautions depending on nature of work

Fecal Dehydroepiandrosterone (DHEA) Immunoreactivity as a Noninvasive Index of Circulating DHEA Activity in Young Male Laboratory Rats

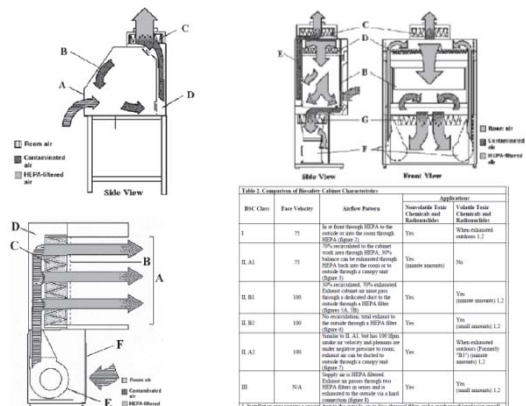
Massimo Bardil,^{1*} Joseph E Hampton,¹ and Kelly G Lambert²

- What is this?
- Primary or secondary barrier?
- How often should proper function be certified?
- Suitable for work with what level agents?



Aerosolized *Bacillus anthracis* Infection in New Zealand White Rabbits: Natural History and Intravenous Levofloxacin Treatment

Steven B Yee,^{1*} Joshua M Hatkin,¹ David N Dyer,² Steven A Orr,^{3,4} and M Louise M Pitt¹



Catheterization of Intestinal Loops in Ruminants Does Not Adversely Affect Loop Function

G Douglas Inglis,¹ John P Kastelic,¹ and Richard R E Uwiera²

Refinement of Vascular Access Port Placement in Nonhuman Primates: Complication Rates and Outcomes

Melanie L Graham,¹ Lucas A Match, Eric F Rieke, Michele Dunning, Elizabeth K Zolondek,
Aaron W Fatg, Bernhard J Hering, and Henk-Jan Schuurman

In accordance with Animal Care Policy #3, the sheep used in this study:

1. May be euthanized using expired agents if approved by the IACUC
2. May receive expired saline if approved by the IACUC
3. May be moved 'off-site' prior to full recovery from anesthesia if approved by the IACUC
4. May be sedated with non-pharmaceutical grade compounds if approved by the IACUC
5. May undergo surgery in a non-dedicated space if approved by the IACUC

VAPs

- Titanium
- Polysulfone
- Polysulfone



In accordance with Animal Care Policy #3, the sheep used in this study:

1. May be euthanized using expired agents if approved by the IACUC (**Never**)
2. May receive expired saline if approved by the IACUC (**If acute**)
3. **May be moved 'off-site' prior to full recovery from anesthesia if approved by the IACUC**
4. **May be sedated with non-pharmaceutical grade compounds if approved by the IACUC**
5. May undergo surgery in a non-dedicated space if approved by the IACUC (**Never**)

Blood D-(-)-3-Hydroxybutyrate Concentrations after Oral Administration of Trioctanoin, Trinonanoin, or Tridecanoin to Newborn Rhesus Monkeys (*Macaca mulatta*)

Mark A Tetrick,¹ Frank R Greer,² and Nofrin J Benevenga^{1,3*}

The monkeys used in this study were fed a special diet and blood was collected. The animals were placed on census on October 1, 2010. Which of the following regarding the annual report to USDA is true:

1. Class B, placed on the report submitted 12/1/2010
2. Class C, placed on the report submitted 12/1/2010
3. Class D, placed on the report submitted 12/1/2010
4. Class C, placed on the report submitted 12/1/2011
5. Class D, placed on the report submitted 12/1/2011

Now...go forth with confidence!

The monkeys used in this study were fed a special diet and blood was collected. The animals were placed on census on October 1, 2010. Which of the following regarding the annual report to USDA is true:

1. Class B, placed on the report submitted 12/1/2010
2. Class C, placed on the report submitted 12/1/2010
3. Class D, placed on the report submitted 12/1/2010
4. **Class C, placed on the report submitted 12/1/2011**
5. Class D, placed on the report submitted 12/1/2011

Animal Care Policy #17

- USDA fiscal year is October 1-September 31
 - Each animal used counted only once
- Form 7023 (7023-A): Classes B-E
- Report due in regional office by December 1