COMPARATIVE MEDICINE
JOURNAL REVIEW 2011

Workshop in Laboratory Animal Medicine
North Carolina State University
May 17, 2012
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JOURNAL REVIEW

- Read all journals
- Take notes for future reference
- Generate questions from each journal
  - Examination questions must have 2 references!!!

FEBRUARY 2011

- Mouse models- 4 articles
- Rat models- 2 articles
- NHP models- 2 articles
- Multiple species models- 1 article
- Case study

Association between Hair-Induced Oronasal Inflammation and Ulcerative Dermatitis in C57BL/6 Mice

- Periodontitis
  - Sheep, cats, dogs, rice rats

What is the genus and species of the rice rat?

*Oryzomys palustris*

According to the 2007 AVMA Guidelines on Euthanasia, the optimal flow rate of this agent should displace what chamber volume per minute?

a) 10%  b) 20%  c) 30%  d) 40%

b) 20%
Paternal Experience and Stress Responses in California Mice (Peromyscus californicus)

- Paternal care of offspring
  - Marmosets (Callithrix spp.), cotton-top tamarins (Saguinus oedipus), prairie voles (Microtus ochrogaster), California mice (Peromyscus californicus)

Which of the following has neuroprotective properties during periods of prolonged stress?
- a) Dehydroepiandrosterone (DHEA)
- b) 17α-hydroxyprogesterone
- c) 11-deoxycorticosterone

What component of fox feces is used to stimulate fear responses in mice?
- a) 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine
- b) 2,5-dihydro-2,4,5-trimethylthiazoline (TMT)
- c) Methyl 3b-hydroxy-1αH,5αH-tropane

The Effects of Diet Composition on Body Fat and Hepatic Steatosis in an Animal (Peromyscus californicus) Model of the Metabolic Syndrome

- Dual-energy X-ray absorptiometry (Dexa scan)
- Can you identify other imaging modalities?
  - MRI, ultrasound biomicroscopy, quantitative computed tomography, microcomputed tomography

The Effects of Diet Composition on Body Fat and Hepatic Steatosis in an Animal (Peromyscus californicus) Model of the Metabolic Syndrome

- HaCaT = human immortalized keratinocyte cells
- Crl:SKH1-hr
  - Outbred
  - Euthymic
  - Immunocompetent
  - Research uses:
    - Wound healing
    - Safety & efficacy
    - Dermal
    - UV radiation

What is the wavelength of UVB irradiation?
- a) 320-400 nm
- b) 290-320 nm
- c) ≤290 nm

Protective Effect of Inositol Hexaphosphate Against UVB Damage in HaCaT Cells and Skin Carcinogenesis in SKH1 Hairless Mice

Pneumocystis carinii Infection Causes Lung Lesions Historically Attributed to Rat Respiratory Virus

- Perivascular lymphocytic cuffing
- Lymphohistiocytic interstitial pneumonia

Diabetes Enhances Dental Caries and Apical Periodontitis in Caries-Susceptible WBN/KobSlc Rats

- Periodontitis
  - WBN/KobSlc rats
  - C57BL/6 mice
- Diabetes Type 1 and Type 2 animal models
Rhesus Rhadinovirus
Retroperitoneal Fibromatosis
Gammaherpesviruses
Latent
Immunosuppression

Retroperitoneal fibromatosis is a gammaherpesvirus that is most frequently associated with:

a) SRV/D-1  b) SRV/D-2  c) SRV/D-3  d) SRV/D-4
b) SRV/D-2

Ventricular arrhythmias
Common in chimpanzees
Potentially associated with underlying heart disease and sudden cardiac death

What floor area (ft²) is recommended for a juvenile chimpanzee (9 kg) according to the 8th Edition of the Guide?
a) 12  b) 15  c) 18  d) 21
b) 15

Rodents
Open growth plates throughout life
No Haversian system

Western blots are used to detect which of the following?
a) DNA  b) RNA  c) Proteins
c) Proteins
Assessment of neuromuscular impairment
- Inverted screen test
- Vertical pole test
- Wire hang test

Sleep deprivation protocols
- Gentle handling or forced locomotion
- Flower pot
- Disc

Lewis rats are a research model for which of the following conditions?
- a) Prostatic adenocarcinoma
- b) Hypertension
- c) Obesity
- d) Multiple sclerosis

Fisher-to-Lewis renal transplant model
- Chronic allograft nephropathy

Obesity-prone rat strains
- Zucker
- Zucker Diabetic Fatty Rat
- Obese Prone CD Rat

Effects of Short-Term Fasting in Male Sprague–Dawley Rats

Spermatogenesis in Ferret Testis Xenografts: A New Model
- Xenograft, Allograft, Autograft
- Ferret reproductive data
  - Monoestrus
  - Induced ovulators
  - 42 day gestation
  - Altricial pups
    - Ability to hear @ 32 days
    - Opening of eyes @ 34 days

Long-Term Evaluation of a Selective Retrograde Coronary Venous Perfusion Model in Pigs (Sus Scrofa Domestica)
- Blood supply from coronary artery is right-side dominant
  - No preexisting collateral circulation
- Left azygous vein drains the intercostal vessels into the coronary sinus
- Aorta has a true vaso vasorum

A Model of Hemorrhagic Shock and Acute Lung Injury in Landrace–Large White Swine
Potential biomarkers for incipient cardiovascular disease
- Postmortem examination and histopathology

Dystocia → 3 P's
- Power (insufficient contractions or expulsive effort)
- Passenger (inappropriate fetal presentation, position, development)
- Passage (pelvic abnormalities)

Are pigtailed macaques seasonal or non-seasonal breeders?
Non-seasonal

Risk of dystocia
- Proportion of viable births
- Proportion of cesarean sections
- Gestational age, total previous births, infant's birth weight

Which of the following is a model for dystocia?
Answer: Squirrel Monkey

Aortic dissecting aneurysm
- Stains
  - Mallory phosphotungstic-acid hematoxylin stain
  - Fibrin
  - Masson's trichrome stain
  - Fibrous connective tissue

Lack of Effect of Murine Norovirus Infection on a Mouse Model of Bacteria-Induced Colon Cancer
- Murine Norovirus
  - Non-enveloped
  - Orofacial
  - Tropism for dendritic cells & macrophages

Noroviruses belong to what family?
a) Coronaviridae  b) Caliciviridae  
c) Picornaviridae  d) Paramyxoviridae
b) Caliciviridae
Severe combined immunodeficiency (SCID) mice
- Lack functional B & T cells
- High incidence of T-cell thymic lymphomas

Matching (mice)
1. Motheaten  a) Chromosome 14
2. Rag 1 & Rag 2  b) Chromosome 11
3. Nude  c) Chromosome 6
4. Hairless  d) Chromosome 13
5. Beige  e) Chromosome 2

An Alternative In Vivo Method to Refine the Mouse Bioassay for Botulinum Toxin Detection
- Mouse Bioassay (MBA)
  - Only approved BoNT detection procedure in the U.S.
- Toe-spread research model

Which of the following readily inactivates botulinum toxin?
a) NaOCl  b) NaOH  c) Ozone
Answer- a, b, c

Removal of Potentially Confounding Phenotypes from a Siamese-Derived Feline Glaucoma Breeding Colony

According to the AWA, it is acceptable to transport kittens in the same enclosure with an adult cat (other than the dam) at what age?
a) 14 weeks  b) 15 weeks  c) 16 weeks  d) 17 weeks  
d) 17 weeks

Hemodynamic and Histologic Characterization of a Swine (Sus scrofa domestica) Model of Chronic Pulmonary Arterial Hypertension
- Experimental models of PAH
  - Small animals (rats and mice)
    - Hypoxia, monocrotaline, genetic modifications, surgical shunts
  - Large animals (pigs, sheep, dogs, macaques, calves, and apes)
    - Aortopulmonary shunt model*, hypoxia, monocrotaline, and infectious agents
Minipig identification:
1. Yucatan
2. Sinclair
3. Hanford

Psychogenic Alopecia in Rhesus Macaques Presenting as Focally Extensive Alopecia of the Distal Limb
- Alopecia
- Inflammatory, allergic, genetic, nutritional, infectious, idiopathic

Which of the following stains was used to quantify perivascular inflammation (mast cells)?
a) Hematoxylin solution  
b) Methyl violet  
c) Rose bengal  
d) Toluidine blue
- d) Toluidine blue

Alterations in Peripheral Blood B-cell Populations in SHIV/89.6P-infected Macaques (Macaca fascicularis)
- SHIV
  - Follicular hyperplasia
  - Germinal center abnormalities

Colonization with Nontuberculous Mycobacteria Is Associated with Positive Tuberculin Skin Test Reactions in the Common Marmoset (Callithrix jacchus)
- Old World primates (Mycobacterium tuberculosis complex)
  - M. bovis, M. africanum, M. canetti, and M. microti
- New World primates (Nontuberculous Mycobacteria)
  - M. avium complex, M. kansasii, M. gordonae
- Tuberculin skin test
  - Mammalian Old Tuberculin
  - 24, 48, 72 hrs.
  - Grades 1 – 5

False-negative results
- Latent infection, anergy, defective cellular immunity

False-positive results
- Sensitized to nontuberculous mycobacterial (NTM) species, trauma, exposure to Freund complete adjuvant, Bacillus-Calmette-Guerin vaccine

Acid-fast stains
- Ziehl-Neelsen
- Fite-Faraco

Colonization with Nontuberculous Mycobacteria Was Diagnosed as the Cause of the Following Lesions. Please provide the correct classification for this organism.
a) Runyon group I  
b) Runyon group II  
c) Runyon group III  
d) Runyon group IV
- a) Runyon group I
**August 2011**

- Overviews: 2 articles
- Fish models: 1 article
- Mouse models: 5 articles
- Rat models: 2 articles

**The Use of Animal Models for Stroke Research: A Review**

- Animal models
  - Induced
    - Experimental
      - Diabetes mellitus
    - Spontaneous
  - Natural occurrence
  - Orphan
    - Natural occurrence in nonhuman app. but not described in humans

- Stroke research animal models
  - Mice & rats (most common)
  - Rabbits, dogs, swine, nonhuman primates

**Environmental Enrichment of Laboratory Rodents: The Answer Depends on the Question**

According to the 8th edition of the Guide, how often should the IACUC, researchers, and veterinarians review enrichment programs?

- a) Semi-annually
- b) Annually
- c) Regular Basis
- d) Every 3 years

- c) Regular Basis

**Transmission, Diagnosis, and Recommendations for Control of Pseudoloma neurophilii Infections in Laboratory Zebrafish (Danio rerio) Facilities**

- *Pseudoloma neurophilii*
  - Obligate intracellular parasite

- Transmission
  - Cannibalization
  - Spawning

- Clinical signs
  - Nonspecific
  - Emaciation & spinal curvature
  - Normal appearance

Microsporidian spores are stained red in histologic sections with which of the following stains?

- a) Hematoxylin & Eosin
- b) Fungi-Fluor
- c) GMS
- d) Luna

- d) Luna

**Murine Norovirus Increases Atherosclerotic Lesion Size and Macrophages in Ldlr<sup>−/−</sup> Mice**

- MNV
  - Single-stranded RNA
  - Caliciviridae
  - Infects dendritic cells and macrophages

- Atherosclerosis
  - Mice are naturally resistant
  - Mouse model = Ldlr<sup>−/−</sup>
  - Intraperitoneal glucose tolerance test (IPGTT)
  - Intraperitoneal insulin tolerance test (IPITT)
Murine Norovirus Increases Atherosclerotic Lesion Size and Macrophages in \textit{Ldlr}^{-/-} Mice

- Control
- MmV

STR/ort Mice, a Model for Spontaneous Osteoarthritis, Exhibit Elevated Levels of Both Local and Systemic Inflammatory Markers

- STR/ort mice
  - Model for osteoarthritis (spontaneous)
  - Male mice
  - Patella displacement

- CBA mice
  - Osteoarthritis resistant

The Streptozotocin-Induced Diabetic Nude Mouse Model: Differences between Animals from Different Sources

- Streptozotocin
- Damages pancreatic \( \beta \) cells
- Hypoinsulinemia
- Hyperglycemia

- Adverse effects
  - Hepatotoxicity
  - Nephrotoxicity

Which of the following is not a diabetic research model?

- a) ZDF-Lepr\textsuperscript{fa}/Crl
- b) SHHF/MccGmiCrl-Lepr\textsuperscript{cp}/Crl
- c) CD:SD-Tg(ins2-IAPP)Soel
- d) NBL/CrCrl

Buried food-pellet test
- Utilized to gauge olfaction
- Anosmia
- Loss of smell

Effects of Zinc Gluconate and 2 Other Divalent Cationic Compounds on Olfactory Function in Mice

- Morris water maze
  - Spatial memory

Prior Parity Positively Regulates Learning and Memory in Young and Middle-Aged Rats

Which of the following cytological descriptions correctly describes proestrus in the rat?

- a) epithelial, round nucleated
- b) epithelial keratinized
- c) polymorphonuclear cells
- d) Leukocytes and pavement cells

a) epithelial, round nucleated
Inferior Ectopic Pupil and Typical Ocular Coloboma in RCS Rats

- RCS (Royal College of Surgeons) rats
  - Inbred
  - Model for Inherited retinal degeneration and ocular coloboma

OCTOBER 2011

- Mouse model- 1 articles
- Rat models- 2 articles
- Rabbit models- 2 articles
- Feline model- 1 article
- Swine models- 2 articles
- NHP models- 2 articles

Lactate Dehydrogenase-Elevating Virus (LDV)
- Enveloped RNA virus
- Arteriviridae
- Contaminant of transplantable tumors
- Life-long viremia

LDV-associated poliomyelitis (requirements)
- Immunosuppression
- 2 viruses (LDV & MuLV)
- Replication permissive allele

Immunosuppressed AKR and C58 mice are homozygous for which allele making them prone to LDV-induced poliomyelitis?

1. Dc78n
2. Jc7n
3. Ma4n
4. Tw24n
5. Fv1n/n

N-methyl-N’-nitro-N-nitrosoguanidine (MNNG)
- Gastric cancer in rats, hamsters, and dogs

Hemorrhagic shock
- Fixed-volume
- Withdrawing blood based on body weight
- Fixed-pressure
- Withdrawing blood until the desired blood pressure
- Male Wistar rats
- Well controlled MAP

Sex-Associated Difference in Estrogen Receptor β Expression in N-Methyl-N’-Nitro-N-Nitrosoguanidine-Induced Gastric Cancers in Rats

- N-methyl-N’-nitro-N-nitrosoguanidine (MNNG)
- Gastric cancer in rats, hamsters, and dogs

Male Wistar rats

Osteochondral allograft animal models
- Rabbits, dogs, sheep, goats, rats, baboons
- New Zealand White and Dutch Belted rabbits

Rabbit Trochlear Model of Osteochondral Allograft Transplantation

- Osteochondral allograft animal models
- Rabbits, dogs, sheep, goats, rats, baboons
- New Zealand White and Dutch Belted rabbits
Incidence of Spontaneous Ocular Lesions in Laboratory Rabbits

- Slit-lamp biomicroscopy

Renal Failure Associated with Mucopolysaccharidosis Type I in a Cat from a MPS I Research Colony

- Mucopolysaccharidosis
  - Lysosomal storage disease
  - Animal models
    - Dogs, cats, mice
  - Zebra bodies
    - Lysosome containing broad transversely-stacked myeloid membranes

Renal Failure Associated with Mucopolysaccharidosis Type I in a Cat from a MPS I Research Colony

- Lysosomal storage disease animal models
  - Mice (gene knockout technology)
  - Dogs
    - Cairn and West Highland white terriers
    - Globoid cell leukodystrophy (Krabbe’s disease)
  - Siamese cats
  - Rats, Guinea pigs, quail, sheep, emu, goats, cattle, and horses

Surgical Porcine Myocardial Infarction Model through Permanent Coronary Occlusion

- Myocardial infarction in swine
  - Open-chest (surgical)*
    - Precise control of site of occlusion
    - Visual assessment
  - Closed-chest (percutaneous catheterization)
    - Limited knowledge of exact location, length and duration of arterial occlusion

Horner Syndrome After Carotid Sheath Surgery in a Pig: Anatomic Study of Cervical Sympathetic Chain

- Horner syndrome
  - Ipsilateral eyelid ptosis
  - Pupil miosis
  - Facial anhydrosis

Morphometric Variables Related to Metabolic Profile in Captive Chimpanzees (Pan troglodytes)

- Obesity determination
  - Body fat estimation (morphometric techniques)
    - Waist circumference
Mouse models - 4 articles
Rat models - 1 article
Nonhuman primate models - 5 articles

Myobia musculi belong to what suborder?
a) Mesostigmata  b) Prostigmata
c) Astigmata  d) Metastigmata
b) Prostigmata

Hypothermia
Most valuable characteristic for predicting death
Weight loss
Measure of the product of temperature and body weight

Retained fetal membranes (RFM)
Failure to expel fetal membranes within 12 – 24 hr. post parturition
Common in cows, ewes, horses, and pigs
Rare in cats, toy-breed dogs, guinea pigs, and mice
Diagnosis
Physical exam, CBC, radiography, ultrasonography, exploratory laparotomy
Treatment
Oxytocin or prostaglandin injections, antimicrobials
Surgical removal of the uterus or ovariohysterectomy
Retained Fetal Membranes in C57BL/6NCrl Mice: Description of Clinical Case Presentations and Related Epidemiologic Findings

Bilateral Traumatic Temporomandibular Joint Luxation in a Rat

which of the following is the correct dental formula for the rat?

a) 2(I 1/1, C 0/0, PM 0/0, M 3/3)
b) 2(I 1/1, C 0/0, PM 1/1, M 3/3)
c) 2(I 2/1, C 0/0, PM 3/2, M 3/3)
a) 2(I 1/1, C 0/0, PM 0/0, M 3/3)

Obesity in Rhesus and Cynomolgus Macaques: A Comparative Review of the Condition and Its Implications for Research

- Obesity animal models:
  - Dogs, pigs, hamsters, rats, mice, NHP’s
- Obesity onset:
  - High fat diets
  - Surgical force feeding
  - Genetic modification
- Obesity detection:
  - Morphometric measurements
    - Crown-rum length
    - Weight
    - Abdominal subcutaneous fat
    - Skin fold thickness

Spontaneous Gastric Carcinomas in Sooty Mangabeys (Cercocebus atys)

- Sooty mangabey (Cercocebus atys)
  - West Africa
  - Research uses:
    - AIDS pathogenesis
    - Reproductive biology
    - Behavior
  - 8 cases of spontaneous gastric carcinomas

Spontaneous Gastric Carcinomas in Sooty Mangabeys (Cercocebus atys)

Ruptured Myotic Aortic Aneurysm in a Sooty Mangabey (Cercocebus atys)

- Myotic aneurysm
  - Infected aneurysm regardless of the etiology
- Aneurysm classification
  - “True”: involve all layers of the arterial wall
  - “False”: form outside of the arterial wall due to a leak in an artery (hematoma)
Simian retrovirus type D (SRVD)
- Single stranded RNA virus (Retroviridae)
- Isolated from monkeys of the genus (*Macaca*)
- Clinical signs
  - Asymptomatic
  - Nonspecific - diarrhea, weight loss, splenomegaly
  - Immunosuppression and neoplasia (fibrosarcoma and retroperitoneal fibromatosis)
- Clinical pathologic findings
  - Anemia, neutropenia, lymphopenia, thrombocytopenia

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Questions???

What is the genus and species of the rice rat?
*Oryzomys palustris*

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b) 20%

Which of the following has neuroprotective properties during periods of prolonged stress?
- a) Dehydroepiandrosterone  b) 17-α-hydroxyprogesterone  c) 11-deoxycorticosterone  d) Dehydroisoandrosterone (DHIA)

a) Dehydroepiandrosterone (DHEA)

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- a) 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP)  b) 2,5-dihydro-2,4,5-trimethylthiazoline (TMT)  c) Methyl 3b-hydroxy-1aH,5aH-tropane  d) 2,5-dihydro-2,4,5-trimethylthiazoline (TMT)

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What is the wavelength of UVB irradiation?
- a) 320-400 nm  b) 290-320 nm  c) ≤290 nm  d) 250-320 nm

b) 290-320 nm
Retroperitoneal fibromatosis is a gammaherpesvirus that is most frequently associated with:

a) SRV/D-1  b) SRV/D-2  c) SRV/D-3  d) SRV/D-4

b) SRV/D-2

What floor area (ft²) is recommended for a juvenile Chimpanzee (9 kg) according to the 8th Edition of the Guide?

a) 12  b) 15  c) 18  d) 21

b) 15

Western blots are used to detect which of the following?

a) DNA  b) RNA  c) Proteins

c) Proteins

Lewis rats are a research model for which of the following conditions?

a) Prostatic adenocarcinoma  b) Hypertension  c) Obesity  d) Multiple sclerosis

Multiple sclerosis

Are pigtailed macaques seasonal or non-seasonal breeders?

Non-seasonal

Which of the following is a model for dystocia?

Answer: Squirrel Monkey

Noroviruses belong to what family?

a) Coronaviridae  b) Caliciviridae  c) Picornaviridae  d) Paramyxoviridae

b) Caliciviridae

Matching (mice)

1. Motheaten Chromosome 6
   a) Rag 1 & Rag 2

2. Rag 1 & Rag 2 Chromosome 2
   b) B and D

3. Nude Chromosome 11
   c) tumour

4. Hairless Chromosome 14
   d) Beige

5. Beige Chromosome 15

Which of the following readily inactivates botulinum toxin?

a) NaOCl  b) NaOH  c) Ozone  d) None

Answer: a, b, c

According to the AWA, it is acceptable to transport kittens in the same enclosure with an adult cat (other than the dam) at what age?

a) 14 weeks  b) 15 weeks  c) 16 weeks  d) 17 weeks

d) 17 weeks

Which of the following stains was used to quantify perivascular inflammation (mast cells)?

a) Hematoxylin solution  b) Methyl violet  c) Rose bengal  d) Toluidine blue

d) Toluidine blue

Please provide the correct classification for this organism.

a) Runyon group I  b) Runyon group II  c) Runyon group III  d) Runyon group IV

a) Runyon group I

Which vessel is depicted by the symbol “ ” in the photographs of the rabbit encephalon?

a) Superior cerebellar artery  b) Lower anterior cerebellar artery  c) Basilar artery  d) Internal carotid artery

c) Basilar artery

According to the 8th edition of the Guide, how often should the IACUC, researchers, and veterinarians review enrichment programs?

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c) Regular Basis

Microsporidian spores are stained red in histologic sections with which of the following stains?

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Which of the following is not a diabetic research model?

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Which of the following cytological descriptions correctly describes proestrus in the rat?

a) epithelial, round nucleated  b) epithelial keratinized  c) polymorphonuclear cells  d) Leukocytes and pavement cells

epithelial, round nucleated

Immunosuppressed AKR and C57 mice are homozygous for which allele making them prone to LEV-induced poliomyelitis?

a) Acr/akr  b) d7a  c) Mims  d) Tuba

a) Acr/akr

Myobia musculi belong to what suborder?

a) Mesostigmata  b) Prostigmata  c) Astigmata  d) Metastigmata

b) Prostigmata

Which of the following is the correct dental formula for the rat?

a) II 1/1, C 0/0, PM 0/0, M 3/3  b) II 1/1, C 0/0, PM 0/0, M 3/3  c) II 2/1, C 0/0, PM 0/0, M 3/3  d) II 3/1, C 0/0, PM 0/0, M 3/3

a) II 1/1, C 0/0, PM 0/0, M 3/3