2007 TOPICS IN LABORATORY ANIMAL MEDICINE

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Laboratory Rats

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THANK YOU!

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Disclaimers

- 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 ACLAM Board examinations



Genus and Species?

- Rattus norvegicus
- What anatomical structures are they missing?
 - Gall Bladder
 - Tonsils
 - Foramen of Magendie





What kind of rat is this?

- Long Evans
- Inbred or Outbred?
 - Outbred
- What hooded rat has the mutation that causes renal cell carcinoma?
 - EKER





EKER Rat

- Mutation in the TSC2 gene (Tuberous Sclerosis Complex)
- 100% develop renal tumors by 12 months
- Model for von Hippel-Lindau disease





What type of hooded rat is this?

- Fawn hooded rat
- What types of abnormalities does this rat have?
 - Abnormal platelet function
 - Hypertension





Other Hooded Rats...

- What is the LEC rat?
 - Long Evans Cinnamon
- What abnormality does this rat exhibit?
 - Hepatitis
- Fulminant hepatitis and jaundice at four months of age.
- About 50% of animals die within 1 week of onset of clinical signs.
- Survivors develop hepatocellular carcinoma after 1-1.5 years.
- Model for Wilson's disease. Also think Bedlington Terrier.



Other Hooded Rats...

- What hooded rat develops retinal degeneration?
 - RCS
- RCS (Royal College of Surgeons)
- Carries gene for retinal dystrophy.
- Overproduction of rhodopsin and progressive loss of photoreceptor cells beginning in third postnatal week.



What hooded rat is agouti with a white belly and feet?

- ACI
- What abnormality does this rat have?
 - Genitourinary abnormalities
 - Absent, hypoplastic or cystic kidneys
 - Sometimes associated with an absent or defective uterine horn or atrophic testes on the same side





 What albino rat is a model for Type 1 Diabetes?

– BB

- Outbred Wistar rats at Bio-Breeding Labs.
- Abrupt onset of diabetes 60-120d age.
- Lymphocytic insulitis, destruction of pancreatic beta cells.
- Males > Females.





- What abnormality is exhibited by the SHR rat?
 - Hypertension
- Spontaneously Hypertensive Rat.
- Develop hypertension spontaneously at 7-15 weeks.





Which rat strain/stock is an accepted genetic control animal for the SHR strain used in hypertension studies?

- BB
- LEW
- WKY
- SHR/SP
- DIO



Which rat strain/stock is an accepted genetic control animal for the SHR strain used in hypertension studies?

- BB
- LEW
- WKY (Wistar Kyoto)
- SHR/SP
- DIO

References:

- Belanger et al. 2003. Effect of hypertension on reproductive organ weights in various strains of rats. Contemp Top Lab Anim Sci 42(6):39-41.
- Fox JG, Anderson LC, Loew FM, Quimby FW, eds. 2002. Laboratory Animal Medicine, 2nd edition. Academic Press, San Diego, CA. Chapter 4 Biology and Diseases of Rats, p. 122.
- Charles River Laboratories Research Models and Services 2006 US Catalog, page 10.

- What rat was developed from Sprague-Dawley stock selected for sodium chloride-induced hypertension?
 - Dahl Salt Sensitive (DSS)
- Control?
 - Dahl Salt Resistant (DSR)





This is a Dahl Salt-Sensitive Rat. What is the proper nomenclature? Is it outbred/inbred?





This is a Dahl Salt-Sensitive Rat. What is the nomenclature? SS/Jr Is it outbred/inbred? inbred





What happens when you give the Dahl Salt sensitive rat a high salt diet?



What happens when you give a Dahl salt sensitive rat a high salt diet?

Develop dramatic increase in blood pressure

Also develop progressive cardiovascular and renal lesions on normal or low sodium diets.





This rat developed ulcerative dermatitis suspected to be related to a deficiency in what essential fatty acid (EFA)?



Godfrey, et al Clinical Linoleic Acid Deficiency in Dahl Salt-Sensitive (SS/Jr) Rats Comp Med 55(5): 470-475, 2005



This rat developed ulcerative dermatitis suspected to be related to a deficiency in what essential fatty acid (EFA)? **Linoleic Acid**



- What rat is the model for Crigler-Najjar Syndrome?
 – GUNN rat
 - GUNN rat
- What is the abnormality?
 - Hyperbilirubinemia (unconjugated)
 - Jaundice
 - Lacks UDP Glucuronyl Transferase in Liver





Similar Syndromes to Crigler-Najjar...

- What are models for Gilbert Syndrome?
 - Southdown Sheep
 - Indigo Snake
- Unconjugated hyperbilirubinemia
- Reduced bilirubin UGT activity

- What is the model for Dubin-Johnson Syndrome?
 - Corriedale Sheep
- Conjugated
 hyperbilirubinemia
- Impaired hepatobiliary transport of non-bile salt organic anions

- What abnormalities are exhibited by the WAG/Rij rat?
 - Retinal Degeneration
 - Retinitis Pigmentosa
 - Absence Epilepsy
- What albino rat is this strain developed from?
 - Wistar





- What rat strain exhibits autoimmune thyroiditis?
 – BUF
- Autoimmune thyroiditis:
 - Spontaneous
 - After ingestion of 3methylcolanthrene
 - 100% after neonatal thymectomy





- What rat is a model for Hirschsprungs Disease?
 – Spotting Lethal Mutant
- Aganglionic Megacolon
- Recessive sl/sl (Chromosome 15)
- White coat with pigmented spot on head





- The Zucker rat is a model for which of the following diseases or conditions?
 - Obesity
 - Type I diabetes
 - Diabetes insipidus
 - Prostate adenocarcinoma
 - Jaundice



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- Obesity

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Reference:

 Fox JG, Anderson LC, Loew FM, Quimby FW, eds. 2002. Laboratory Animal Medicine, 2nd edition. Academic Press: San Diego, CA. Chapter 4 – Biology and Diseases of Rats, p. 122 (Table I).





What is the FBN rat?





What is the FBN?

F1 hybrid of F344 female and Brown Norway male (F1)



Comparative Medicine 55(1)Feb2005;12-23



- How do these animals differ with respect to auditory sensitivity?
 - FBN approximately 20dB better hearing at higher frequency
 - F344 approximately 20dB better hearing at lower frequency



What type of rat is this?



- Brown Norway (BN)
- What type of renal disease is exhibited by BN rats?
 - Brown Norway Hydronephrosis
- What type of urinary tract disease does BN/Rij rats develop?
 - Spontaneous Ureter Tumors



What type of rat is this?

- Black Rat
- Genus and Species?
 - Rattus rattus





What type of rat is this?

- Nude Rat
- What is the gene symbol for the nude rat?
 - rnu/rnu (Rowett Hooded)
 - rnu^{nz} (Albino New Zealand)
- rnu/rnu exhibit cyclic hair growth
- T-cell deficient







What condition is depicted in these slides?

- Polyarteritis Nodosa (Periarteritis Nodosa): Mesenteric
- Small-Med sized arteries become swollen and damaged
- Immune-mediated disease
- Mesenteric, pancreatic, spermatic arteries




Periarteritis Nodosa

- Mesentery
 - Medial hypertrophy
 - Inflammatory infiltrates around affected vessels
 - Inflammatory cells in perivascular fat (steatitis)
 - Some arteries have fibrinoid degeneration and/or thrombi





What anesthetic combination was most frequently associated with corneal lesions in rats in a recent study?

What anesthetic combination was most frequently associated with corneal lesions in rats in a recent study?

Ketamine and xylazine (60 mg/kg and 12 mg/kg)





What stocks or strains of rats were more likely to develop corneal lesions after anesthesia with ketamine/xylazine?



What stocks or strains of rats were more likely to develop corneal lesions after anesthesia with ketamine/xylazine?

 Wistar and Fischer 344 were the most likely (F 344 was the worst). Long Evans were intermediate in likelihood, and SD and Lewis had low likelihood



What condition is depicted?



• Unilateral cataract



What condition is depicted?



Urolithiasis-calculi in the bladder



Urolithiasis-Large calculi in the bladder





Urolithiasis, hemorrhagic bladder





What can be clinical signs of urolithiasis in these rats?



What are some clinical signs of urolithiasis in these rats?

 Hematuria, red-stained bedding, red-stained or wet pelage, sensitivity to touch in the abdominal area, swollen or palpable kidneys or bladder, unkempt fur, anorexia, reduced urination, reduced water intake, unexpected weight gain or loss



What condition is depicted?



Urolithiasis-Hydronephrosis



Comparative Medicine 53(4)Aug2003;444-7.

What condition is depicted?

- Urinary calculi
- What causative agent was identified?
 - Choline bitartrate
 - Food Chemical Complex Grade





Comparative Medicine 53(4)Aug2003;444-7.

- Rats fed basal diet substituted with choline chloride failed to develop urinary calculi.
- Rats fed basal diet containing FCC grade of choline bitartrate developed urinary calculi.
- Rats fed basal diet containing USP grade choline bitartrate failed to develop urinary calculi.
- P-glycoprotein inhibitor treated rats had significantly reduced risk of developing urinary calculi.



Name the tissue and give the histological description...

• Tissue

- Urinary Bladder
- Histological description
 - Multiple organisms within bladder and in transitional epithelium





Diagnosis?

Trichosomoides crassicauda

(Double operculated egg)





Trichosomoides crassicauda

- Females in urinary bladder, ureters and renal pelvis.
- Small male worms live and are parasitic in the uterus or vagina of the adult female.
- Eggs passed in urine, infection by ingestion of embryonated egg. Eggs hatch in stomach, larvae enter bloodstream then to urinary tract.
- Primary infection from dams to pups prior to weaning.
- Proliferative changes in mucosa neoplasia?



What condition is depicted in this slide?

- Renal Aplasia
- What rat strains exhibit renal abnormalities?
 - ACI often lacks right kidney
 - BN hydronephrosis
 - BN/BiRij bladder and ureter tumors





Name the tissue and give the gross description...

- Tissue
 - Brain
- Gross description
 - Large red/brown mass
 - Ventral midbrain region





What is the most likely tumor?

- Pituitary Chromophobe Adenoma
 - Vast majority of pituitary tumors in rats
 - May have prominent hemorrhagic areas
 - Generally well circumscribed and compress adjacent brain tissue (head tilt?)
 - Females>Males

IMETRIC 1



Name the tissue and give the gross description...



- Tissue
 - Kidney
- Gross description
 - Enlarged kidneys
 - Rough or pitted surface
 - Numerous small yellow foci



Give the histological description...

- Histological description
 - Glomeruli thickened basement membranes, eosinophilic deposits
 - Tubules proteinaceous casts
 - Interstitium lymphocytic infiltrate





What is your diagnosis?

- Hint: 24month old F344 rat.
- Chronic Progressive
 Nephropathy
 - Glomerulonephritis
- What are other major age associated lesions?
 - Neoplasms
 - Polyarteritis nodosa
 - Myocardial degeneration
 - Skeletal muscle degeneration
 - Polyradiculoneuropathy





Name tissues and give the gross description...

- Tissues
 - Kidney
 - Adrenal
- Gross description
 - Left adrenal enlarged
 - Yellow in color
 - May be some areas of hemorrhage





What type of adrenal tumor is this?

- Arises from adrenal medulla
- May produce catecholamines
- Pheochromocytoma





Name the tissue and give the gross description...



- Tissue
 - Lung
- Gross description
 - Multifocal to coalescing white to yellow nodules
 - Congestion
 - Hyperemia

Differential Diagnosis?

- Mycoplasma pulmonis
- CAR bacillus
- Corynebacterium kutscheri





What organism is this?

- Hint: Gram + Rods (Chinese letters)
- Corynebacterium kutscheri
- Hematogenous spread
- Where do you culture for this organism?
 - Oral cavity (carry here)
 - Cervical LN
 - Liver?
 - Brain ?
 - Kidney ?





Name the tissue and give the gross description...

- Tissue
 - Lung
- Gross description
 - Large areas of whiteyellow material throughout the lungs (abscesses, bronchiectasis)
 - Consolidation
 - Atelectasis





Give the histological description...

- Histological description
 - Peribronchiolar infiltrate (BALT proliferation)
 - Diffuse infiltrate w/ hemorrage
 - Bronchioles contain amorphous eosinophilic material





Differential Diagnosis?





- Mycoplasma pulmonis
- CAR bacillus
- Corynebacterium kutscheri



Diagnosis?

- Small, slow growing colonies
- Aerobic to facultatively anaerobic
- Dx: Mycoplasma pulmonis





Mycoplasma pulmonis

- What media is used to culture this organism?
 - Dutch Agar
 - PPLO (Pleuropneumonia-like Organisms) broth
 - Hayflecks, SP4
- In what other sites can this organism be found?
 - Genital tract (uterus, ovary, oviduct)



Diagnosis?



- Most common spontaneous neoplasia of the peritoneum in F344 rats
 - Mesothelioma



Mesothelioma

- Where does this tumor originate in males?
 - Tunica vaginalis
- Where in females?
 - Ovarian bursa
- Rarely seen in females or in pleural cavity





What condition is depicted?

- Rat on the left is normal
- Rat on the right is abnormal
- Ameliogenesis imperfecta
 - Underdevelopment of enamel-forming ameloblasts
 - Inherited through autosomal single recessive gene (ami)




What condition is depicted in this slide?



- Hint: Chronic dermatitis
- Hint: external parasite
- Acariasis



What is this mite?

- Tropical Rat Mite
- Genus and Species?
 - Ornithonyssus bacoti
- What diseases can be carried by this mite?
 - Murine Typhus
 - Rickettsial Diseases
 - Q Fever
 - Plague





- Which of the following is a characteristic of *Ornithonyssus bacoti*, the tropical rat mite?
 - The mite has a life cycle of 28 days from egg to egg production
 - The protonymph stage has been shown to survive for 43 days without food
 - The principle host is *Mus musculus*
 - A single female can lay as many as 1400 eggs during its 90-day lifecycle



- Which of the following is a characteristic of *Ornithonyssus bacoti*, the tropical rat mite?
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 - The protonymph stage has been shown to survive for 43 days without food
 - The principle host is Mus musculus
 - A single female can lay as many as 1400 eggs during its 90-day lifecycle

Reference:

Cole et al. 2005. Ornithonyssus bacoti infestation and elimination from a mouse colony.
 Contemp Top Lab Anim Sci 44(5):27-30.



Other Rat Mites...

- Genus and Species of the Spiny Rat Mite?
 - Laelaps echidninus
- What is this mite a vector for?
 - Hepatozoon muris
- Genus and Species for Ear Mange Mite?
 - Notoedres muris





• Porphyrin staining (chromodacryorrhea)



- Ringtail
- Lesion of young animals
- Annular constrictions with or without sloughing of tail
- Associated with high temperature and low humidity (<40%?) ???





- View of tympanic bullae
- Right and left bullae appear to have whitish material in them.
- Otitis media
- Causative agent?
 - M. pulmonis
 - P. pneumotropica





What structure and condition are depicted?

- Structure
 - Zymbal's Gland
- Zymbal's Gland Tumor
 - Usually present as an ulcerated mass within or just below the external ear canal







Zymbal's Glands

- Modified sebaceous glands
- Surround external ear canal
- Tumors can be induced by a variety of carcinogenic compounds
- Tumors may be either sebaceous or squamous or admixtures



Name the tissue and give the gross description...

- Tissue
 - Liver
- Gross description
 - Enlarged
 - Irregular yellow spots





Give the histological description...

- Histological description
 - Cyst within liver parenchyma
 - Contains eggs and nematode cross section
 - Surrounded by inflammatory infiltrate





Diagnosis?

- Capillaria hepatica
 - Found commonly in liver of wild rats
 - Eggs brownish, double walled, outer wall pitted, double operculum
 - Direct life cycle
 - Host ingests embryonated eggs
 - Hatch in cecum, larvae penetrate cecum
 - Enter portal vein, mature within liver
 - Large numbers of unembryonated eggs in liver
 - When host eaten by carnivore eggs passed in feces and embryonate in soil.



Double Operculated Eggs (Does anyone care that Pete talks?)



- Dioctophyma renale
- Anatrichosoma
- Capillaria
- Trichuris
- Prosthenorchis
- Trichosomoides



Single Operculated Eggs (Fat pigs don't always grunt.)

- Fasciola
- Paragonimus
- Diphylobothrium
- Athesmia
- Gastrodiscoides





Describe the condition



Cervical swelling (enlarged cervical lymph nodes)



Name the tissue and give the gross description...

- Tissue
 - Spleen
- Gross description
 - Spleen on right normal size
 - Spleen on left splenomegaly





Name the tissues and give the gross description...

- Tissues
 - Liver
 - Spleen
- Gross description
 - Splenomegaly
 - Liver enlarged, rounded edges, pale hepatomegaly





Hepatosplenamegaly...





Name the tissue and give the histological description...

• Tissue

- Liver
- Histological description
 - Diffuse sinusoidal infiltrate, large mononuclear cells
 - Basophilic polyhedral cells
 - Prominent nucleus





Diagnosis?

- Large Granular Lymphocytic Leukemia
- Formerly called Mononuclear Cell Leukemia/ Fischer Rat Leukemia
- Very common in aged F344
- Can involve virtually any organ in the body (commonly splenomegaly, hepatomegaly, lymphadenopathy)
- Large granule lymphocytes are of NK cell origin.



What conditions are depicted?

- Top photo
 - Squinting
 - Photophobia
 - Cervical swelling
- Bottom photo
 - Exophthalmos
 - Cloudy cornea





Name the tissue and condition depicted...



- Tissue
 - Eye Cornea
 - Condition
 - Keratitis



Name the tissue and give the histological description...

Tissue

- Glandular tissue
 - Parotid,Harderian, Submandibular,Exorbital Lacrimal
- Histological description
 - Inflammatory infiltrate
 - Interstitial edema
 - Necrosis of ducts
 - Squamous metaplasia





Diagnosis?

- •Sialodacryoadenitis virus (SDAV)
- Coronavirus
- Affects serous or mixed glandsWhich salivary gland spared?
 - Sublingual salivary gland
- Morbidity high, mortality low
- Animals infected and immune within 3-5 weeks.
- Stop breeding for 6-8 wks





Contemporary Topics 43(1)Jan2004;44-6.

What condition is depicted?

- Ocular melanoma
- What are the three types of melanomas?
 - Junctional melanocytomas
 - Dermal melanocytomas
 - Malignant melanomas
- What are the three cellular types of malignant melanoma?
 - Epithelioid
 - Spindle
 - Mixed





Comparative Medicine 54(5)Oct2004;533-542

What structure is depicted?

- Retina
- What are the layers from the top of the picture?
 - 1. Ganglion Cell Layer
 - 2. Inner Plexiform Layer
 - 3. Inner Nuclear Layer
 - 4. Outer Nuclear Layer



Comparative Medicine 54(5)Oct2004;533-542

What condition is depicted in each photomicrograph?



Α

B

- A. Normal Retina
- B. Retinal Degeneration
- What rat is a model for spontaneous retinal degeneration?
 - WBN/Kob
 - Wistar Bonn/Kobori



Comparative Medicine 54(5)Oct2004;533-542



- The WBN/Kob rat is also a model for....
 - Diabetes Mellitus
- Hyperglycemia maintained for a long period
- Examination of exo-endocrine pancreatic impairments
- Only males develop spontaneous diabetes mellitus
- Both males and females exhibit retinal degeneration which does not appear to be related to the diabetes mellitus.



Tissue from a rat with dyspnea. Name the tissue and give the histological description

- Tissue
 - Lung
- Histological description
 - Proliferation of BALT
 - Inflammatory infiltrate
 - Thickened aveolar septi





What type of stain?

- Silver stain
- Bacteria densely clustered at ciliated surface of respiratory epithelium
- Organisms
 - Gram negative
 - Motile
 - Non-spore forming
 - Gliding bacteria





Diagnosis?

- CAR Bacillus
- Ways to diagnose?
 - Histo w/ silver stains
 - Serology (ELISA)
 - Culture (no growth on cell free media)



What diagnostic technique is depicted?

- Nasal Swab
- What type of swab is used?
 - Calgi (calcium alginate) swab
- CAR Bacillus PCR done on nasal swab
 - Advantage can detect infection in younger rats (>=3wks) before colonization of lung occurs



Name the tissue and give the histological description...

- Tissue
 - Lumbosacral spinal nerve root
- Histological description
 - Nerve root on the right appears normal
 - Nerve root on the left severe degeneration
 - Cholesterol clefts





Diagnosis?

- Hx: 34 mo. old rat with hind limb paresis
- Polyradiculoneuropathy
- Spinal nerve root degeneration
 - From lumbar region to cauda equina



- View of abdominal/thoracic cavities
- Diaphragm in the middle
- Diaphragmatic hernia
 with liver incarceration




What condition is depicted?





- Cutaneous nodular lesion (chest, back, tail)
- Crusted, thickened surface
- Keratoacanthoma



Keratoacanthoma

- Originates in sebaceous glands
- Squamous epithelium that forms masses of keratin
- Common in aged rats
- May appear similar to squamous cell carcinoma, squamous papillomas or epidermal inclusion cysts





Causative Agent?

Clinical signs:

- Ulcerative lesions, usually on the dorsal cervical or cranial regions
- Seasonal (spring)
- Trauma incites (ie. shaving, fighting)

Agent?

- Staphylococcus aureus





- Which of the following neoplasms represents the majority of mammary tumors described in older rats?
 - Endothelioma
 - Adenocarcinoma
 - Lymphosarcoma
 - Fibroadenoma
 - Histiocytoma



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 - Endothelioma
 - Adenocarcinoma
 - Lymphosarcoma
 - Fibroadenoma
 - Histiocytoma

Reference:

 Percy DH and Barthold SW. 2001. Pathology of Laboratory Rodents and Rabbits. Iowa State University Press: Ames, Iowa. Chapter 2 – Rats, p. 161.



What is depicted?





- Benign fibroadenoma (most common tumor of rats)
- Can occur anywhere there is mammary tissue
- Hyperplastic fibrous and glandular tissue



Name the tissue and give the gross description...

- Tissue
 - Testes
- Gross description
 - Bilateral
 - Multifocal large white to yellow irregular masses in the parencyma
 - Mass replaces over half of the testicular tissue
 - Hyperemia and hemorrhage





Differential Diagnosis?

- Testicular tumors in rats:
 - Interstitial Cell Tumor (Leydig Cell Tumor)
 - Seminoma
 - Teratoma
 - Sertoli Cell Tumor





What is the most common testicular tumor in rats?

- Interstitial Cell Tumor
 - Although these tumors may become very large, most appear benign
- What strain has high spontaneous occurrence of this tumor type?
 - F344





What condition is depicted?



- Female rat
- Prolapsed tissue
- Vaginal prolapse
- Common in A35322 strain (black hooded rat)



What condition is depicted?

Malocclusion







- Rat bite fever can be caused by Streptobacillus moniliformis or what other organism?
 - Bartonella henselae
 - Spirillum minus
 - Staphylococcus aureus
 - Brucella rattus
 - Pasturella multocida



- Rat bite fever can be caused by *Streptobacillus moniliformis* or what other organism?
 - Bartonella henselae
 - Spirillum minus
 - Staphylococcus aureus
 - Brucella rattus
 - Pasturella multocida

Reference:

Fox JG, Anderson LC, Loew FM, Quimby FW, eds. 2002. Laboratory Animal Medicine, 2nd edition. Academic Press: San Diego, CA. Chapter 25 – Selected Zoonoses, p. 1078.



What condition is depicted?

- Abdominal swelling
- Rule outs:
 - Ascites
 - Organomegaly
 - Neoplasia
 - Adynamic Ileus (megacolon)
- What are possible causes of megacolon?
 - Tyzzer's Disease
 - Chloral hydrate





Tyzzer's Disease

- Clostridium piliforme
- Flaccid dilatation especially ileum
- ("Triad") hepatitis, myocarditis, enteritis
- Fecal-oral transmission by spores
- Demonstration of intracellular organism in tissues: Steiner/Warthin-Starry, Giemsa and Methylene Blue.



Choral Hydrate

- Hypnotic
- Short acting light anesthesia
- Poor analgesia
- Irritating to peritoneum
- Causes adynamic ileus in rats when given IP

Comparative Medicine 53(3)Jun2003;288-292.

What conditioning technique is being demonstrated?

- Thoracic massage
- What was the goal of this conditioning?
 - To conduct echocardiography on unanesthetized rats





Give the gross description...

- Random small, gray to white, raised, multifocal lesions, all lung lobes.
- No clinical signs.



Figure 1. Representative gross lesions seen on the lung of an affected rat.



- Histo may see multifocal pyogranulomatous perivascular infiltrates and foci of interstitial pneumonia
- Lesions most severe in 10-12 wk old rats (best to survey this age group)
- DIAGNOSIS?



Figure 2. Hematoxylin eosin stained section of lung from an affected rat showing foci of interstitial pneumonia.

Rat Respiratory Virus

- A hantavirus ???
- Suspected widespread in rats, but diagnostic tests (serology or PCR) are not yet available for routine screening
- Clinical generally inapparent, but mortality during or shortly after surgery and general anesthesia may be seen
- Ruleouts Sendai, PVM



Give the gross description...



- Gross:
 - Fibropurulent pleuritis, pericariditis, and pneumonia
 - May also see:
 - Suppurative arthritis
 - Meningitis
 - Splenitis
 - Orchitis
 - Infarcts
 - Spleen
 - Testes
- Diagnosis?



Streptococcus pneumoniae



- Histopathology
 - Characteristic organisms
 - Tissue impression smear gram stain (grams + in pairs)
- Culture:
 - Blood agar (10% CO₂)
 - Optochin inhibition (ethylhydrocupreine)
 - Quellung reaction
 - Capsular types 2, 3, 19

Tissue from an rnu/rnu rat with dyspnea

Histo – pulmonary alveoli distended with abundant foamy macrophages.



^{cw} hunter hunter hunter hunter hunter hunter h

Causative agent?

Pneumocystis carinii



Tissue from an rnu/rnu rat with diarrhea

Describe lesions

 Inflammation of large and small intestine and hyperplasia of mesenteric lymph nodes

Causative agent?

- Always include Helicobacter sp with proliferative disease of large bowel
- H. bilis





Comparative Medicine 55(1)Feb2005;55-60

What model is depicted in the figure?



- Rat ligation model of deep venous thrombosis
- What is the leading complication of DVT in humans?
 - Thromboembolism, specifically pulmonary embolism



- All of the following blood vessels can be used for intravenous injections in the rat **EXCEPT**?
 - Dorsal metatarsal vein
 - Sublingual vein
 - Brachial vein
 - Penile vein
 - Lateral tail vein



- All of the following blood vessels can be used for intravenous injections in the rat **EXCEPT**?
 - Dorsal metatarsal vein
 - Sublingual vein
 - Brachial vein
 - Penile vein
 - Lateral tail vein

Reference:

 Fox JG, Anderson LC, Loew FM, Quimby FW, eds. 2002. Laboratory Animal Medicine, 2nd edition. Academic Press: San Diego, CA. Chapter 23 – Techniques of Experimentation, pp. 1009-1010, 1012.



Rats presented with sudden ventral edema and dyspnea.
Necropsy revealed this anomaly.

•What is your diagnosis? Congestive heart failure secondary to persistent patent ductus arteriosis.

•Did it cause the clinical signs? Yes





Comparative Medicine 55(1)Feb2005;85-91



Patent ductus arteriosus (PDA)

- T or F. Initially, a PDA allows right to left shunting of blood.
 - False
- T or F. Over time, the resulting pulmonary hypertension can cause reversal of ductal flow.

- True



Comparative Medicine 55(1)Feb2005;85-91

- Persistent PDA was reported in GEPR-3 rats. What are GEPR rats?
 - Genetically Epilepsy Prone Rats
- What evokes seizures in these rats?
 - Auditory stimulation
- What are the two strains of GEPR rats and what type of seizure characterizes each?
 - GEPR-9 clonic tonic seizures
 - GEPR-3 clonic seizures

