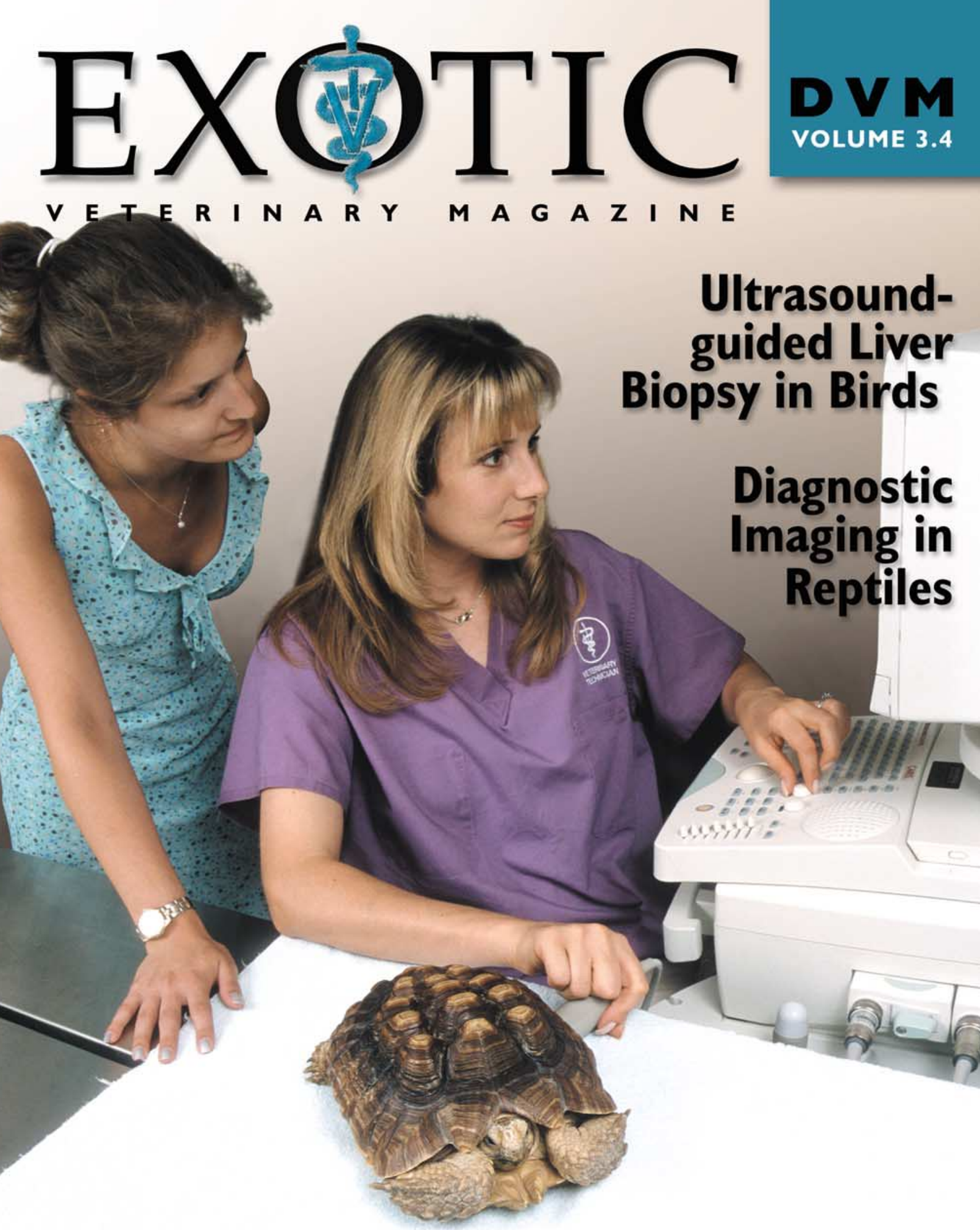
EXOTIC VETERINARY MAGAZINE

DVM
VOLUME 3.4



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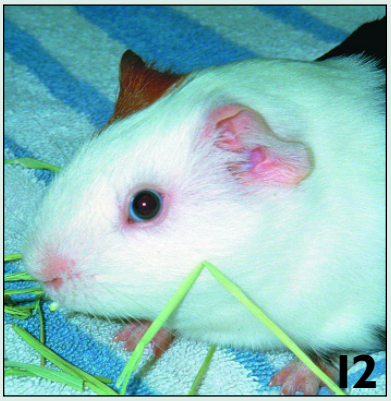

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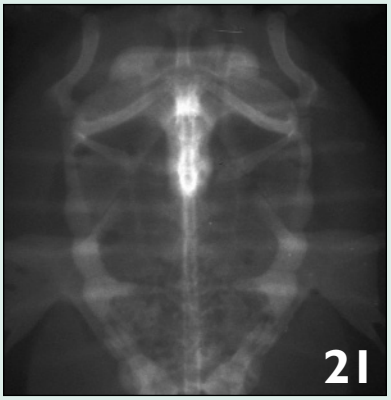

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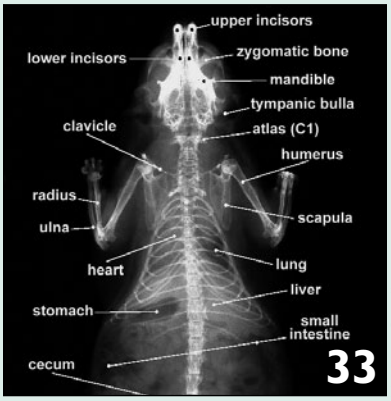


Vittorio Capello

OBSERVATIONS FROM THE FIELD

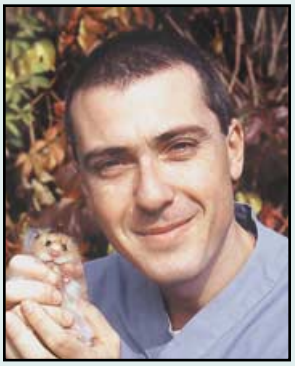
OBSERVATIONS FROM THE FORUM

CLINICIAN'S NOTEBOOK

DEPARTMENTS

Pet Hamster Medicine and Surgery – Part II: Clinical Evaluation and Therapeutics*

VITTORIO CAPELLO



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Vittorio Capello graduated in 1989 from the University of Veterinary Medicine in Milan, Italy. His clinical specialties include first and second opinions for small exotic mammals. In Italy, he is a well known author and speaker on ferrets, rabbits and rodents.

* Adapted from the "Testo atlante di medicina e chirurgia del criceto domestico" (Atlas of Medicine and Surgery of the Pet Hamster) CD-ROM. The 388 pages of text (in Italian) contain more than 400 full-color images and 110 clinical cases. For further information, contact the author at capellov@tin.it.

Restraint

Hamsters are not aggressive pets; however, they can bite if they are stressed, suddenly awakened while sleeping, or when they are ill. To initiate restraint, the hamster should be gently touched on its back and then scruffed. If the hamster reacts aggressively, it can be allowed to move out of its cage, where restraint may be easier to apply.

Russian hamsters rarely bite but are more prone to jump out of one's grasp. These tiny patients can easily be dropped. Very docile dwarf hamsters can be restrained by gently holding their back with the tips of the fingers.

Weight

An accurate weight of the patient is necessary for determining correct drug dosages. This is particularly important for very small mammals like Russian hamsters.

This female Russian hamster weighs only 28 g, but the average weight for this species is 40 g.

The most useful restraint for a clinical examination consists of placing the thumb and forefinger on the neck and firmly scruffing the skin. The hamster is then lifted and held with its weight in the palm of the hand (the animal should not be held by the skin alone). This position allows the veterinarian to view the teeth, limbs, abdomen and genitalia.

If the scruff is not secure, the hamster may be able to move its head and bite the handler. Right-handed people should practice restraining the hamster with the left hand, leaving the opposite hand for the exam. Some owners may be alarmed by this method of restraint, but it is not painful to the hamster.

Pet Hamster Medicine and Surgery – Part II: Clinical Evaluation and Therapeutics

Steps in the Clinical Examination

- History
  - Age and sex
  - Husbandry and nutrition
  - Clinical signs
  - Pre-existing diagnosis
- Inspection of the cage
- Inspection of the hamster in the cage
- Restraint and sexing
- Body weight and temperature
- Examination of:
  - Genitals
  - Teeth and cheek pouches
  - Eyes and ears
  - Skin and flank glands
- Abdominal palpation
- Auscultation
- Diagnostic Tests
  - Radiography
  - Ultrasonography
  - Hematology
  - Serum (or plasma) chemistry analysis
  - Fecal exam (flotation, direct smear, culture)
  - Urinalysis
  - Cultures
  - Cytology
  - Histopathology
  - Necropsy
- Diagnosis (or differential diagnosis)
- Prognosis
- Therapy

Cheek Pouches

During the clinical examination, it is important to evaluate the cheek pouches. This is particularly important for Russian hamsters, which are prone to retain food in the cheek pouches. This tendency predisposes to infection, abscessation or prolapse of the pouches. Golden hamsters usually empty their pouches into the nest. However, sometimes during the clinical exam, it is necessary to push food out with gentle pressure applied from the caudal to cranial aspects of the cheek pouches.

The mucosal surface of the cheek pouch can initially be observed by applying light traction with the fingers on the external skin. The pouch can be further inspected by holding it open with a speculum or a clinical thermometer or, if the hamster is calm, by viewing with an otoscope. One must exercise care to avoid iatrogenic mucosal prolapse.

Cheek pouches should be inspected for the presence of foreign bodies, decayed food or masses. The integrity of the mucosal surface should be carefully evaluated.

Anesthesia

General anesthesia in hamsters is maintained with isoflurane and oxygen delivered by a face mask. In

healthy golden patients, intramuscular administration is recommended for induction agents. The exceptions are tiny Russian hamsters (less than 35 g body weight) in which intramuscular injections are difficult.

If the animal is masked or put into an anesthetic chamber, the hamster can struggle and reach dangerous stress levels, with hypersalivation contributing to the risk of upper airway obstruction.

Some authors have stated that the hamster tongue should be grasped during anesthesia to prevent swallowing. I have not experienced this. Moreover, hamsters are not obligate nasal breathers like rabbits. Face masks are appropriate for all surgical procedures except those performed on the head. The face mask should be transparent to allow the anesthetist to check for mucous membrane color and pupil size.

Loss of standing reflex in a golden hamster 2 minutes after intramuscular injection of ketamine (30 mg/kg) added to xylazine (3 mg/kg).

Blood Collection

Hematology and serum chemistry analysis are less useful in pet hamsters than in other species of mammals due to the difficulty in obtaining a blood sample, the lack of reference values and the typically quick onset and course of clinical signs.

Although venipuncture is very difficult in a hamster weighing less than 150 g, it is mandatory in all hamsters to perform blood collection under isoflurane anesthesia. The best sites for blood collection are the cephalic vein and the lateral saphenous vein. The orbital sinus (used in laboratory animals) is not recommended as a venipuncture site for pet hamsters.

Intracardiac venipuncture is not routinely used in pets, but it is often is the only way to obtain a sufficient volume of blood for testing. Related risks should be discussed with the owner.

Urine Collection

A urine sample in hamsters can be collected from the small amount that might be dribbled on the table during the clinical exam or by very gentle expression of the bladder. Cystocentesis is possible, but difficult in all but large-sized hamsters.

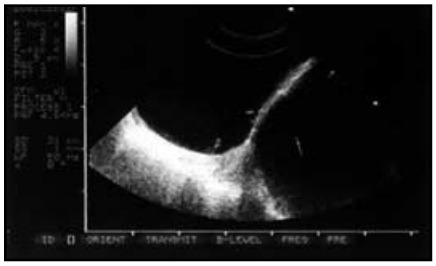
Urinalysis

Volume:	5-8 ml/24h
Color:	Yellowish and turbid
pH:	7.0-8.5
Specific gravity:	1.014-1.060
Sediment:	Calcium and phosphate crystals are normally present. Bacteria are absent and red blood cells and leukocytes are rare.

Ultrasonography

Ultrasonography can be a useful tool for diagnosing intra-abdominal pathologies in pet hamsters and for differentiating cysts, peritoneal effusion and tumor masses.

The exam can be performed without anesthesia if the patient is properly restrained. To prevent hypothermia, fur must remain intact and the ultrasound gel warmed to body temperature. For best results, a B-mode 10 mHz probe is recommended.



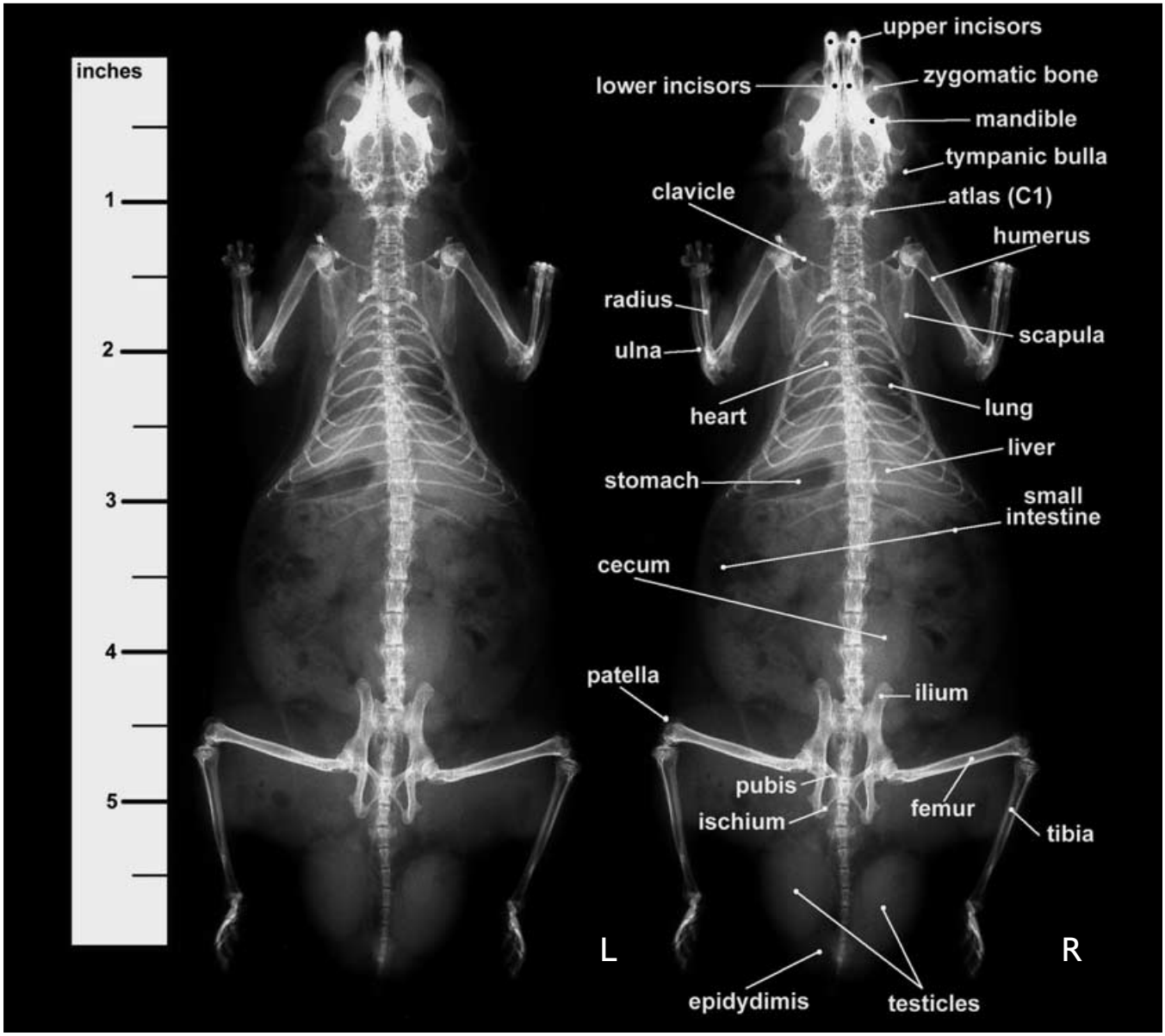
Two large hepatic cysts are imaged in a golden hamster.

Hematologic and Biochemistry Reference Ranges* †

Erythrocytes:	6-10 (avg 8) x 10^3/mm
Hematocrit:	45-50%
Hemoglobin:	10-16 g/dl
Leukocytes:	3-11 (avg 7) x 10^3/mm
Neutrophils:	18-40%
Lymphocytes:	56-80%
Eosinophils:	0-1%
Monocytes:	0-3%
Basophils:	0-1%
Platelets:	200-500 x 10^3/mm
Serum protein:	5.2-7.0 g/dl
Albumin:	3.5-4.9 g/dl
$\alpha 1$ Globulin:	0.30-0.95 g/dl
$\alpha 2$ Globulin:	0.90-2.70 g/dl
β Globulin:	0.10-1.35 g/dl
γ Globulin:	0.15-1.28 g/dl
Albumin:Globulin ratio:	0.58:1.24
Serum glucose:	60-150 mg/dl
Blood urea nitrogen:	12-26 mg/dl
Creatinine:	0.4-1.0 mg/dl
Total bilirubin:	0.1-0.9 mg/dl
Cholesterol:	55-181 mg/dl
Serum calcium:	5.3-12.0 mg/dl
Serum phosphate:	3.0-9.9 mg/dl
Amylase:	120-250 IU/L
Alkaline phosphatase:	3.2-30.5 IU/L
Acid phosphatase:	3.9-10.4 IU/L
Alanine transaminase (ALT):	11.6-35.9 IU/L
Aspartate transaminase (AST):	37.6-168.0 IU/L
Creatine phosphokinase (CPK):	0.5-1.9 IU/L
Lactic dehydrogenase (LDH):	56-170 IU/L
Uric acid:	1.8-5.3 mg/dl
Sodium:	128-144 mEq/L
Potassium:	4.0-5.9 mEq/L
Chloride:	3.9-5.5 mEq/L
Bicarbonate:	3.27-4.41 mEq/L
Magnesium:	2.2-2.5 mg/dl

* Adapted from Leck S: What every veterinarian needs to know about hamsters. Exotic DVM 2(5):38-41, 2000.

† As with all species, data for reference ranges should be established for the individual pet over time by the same laboratory methods.

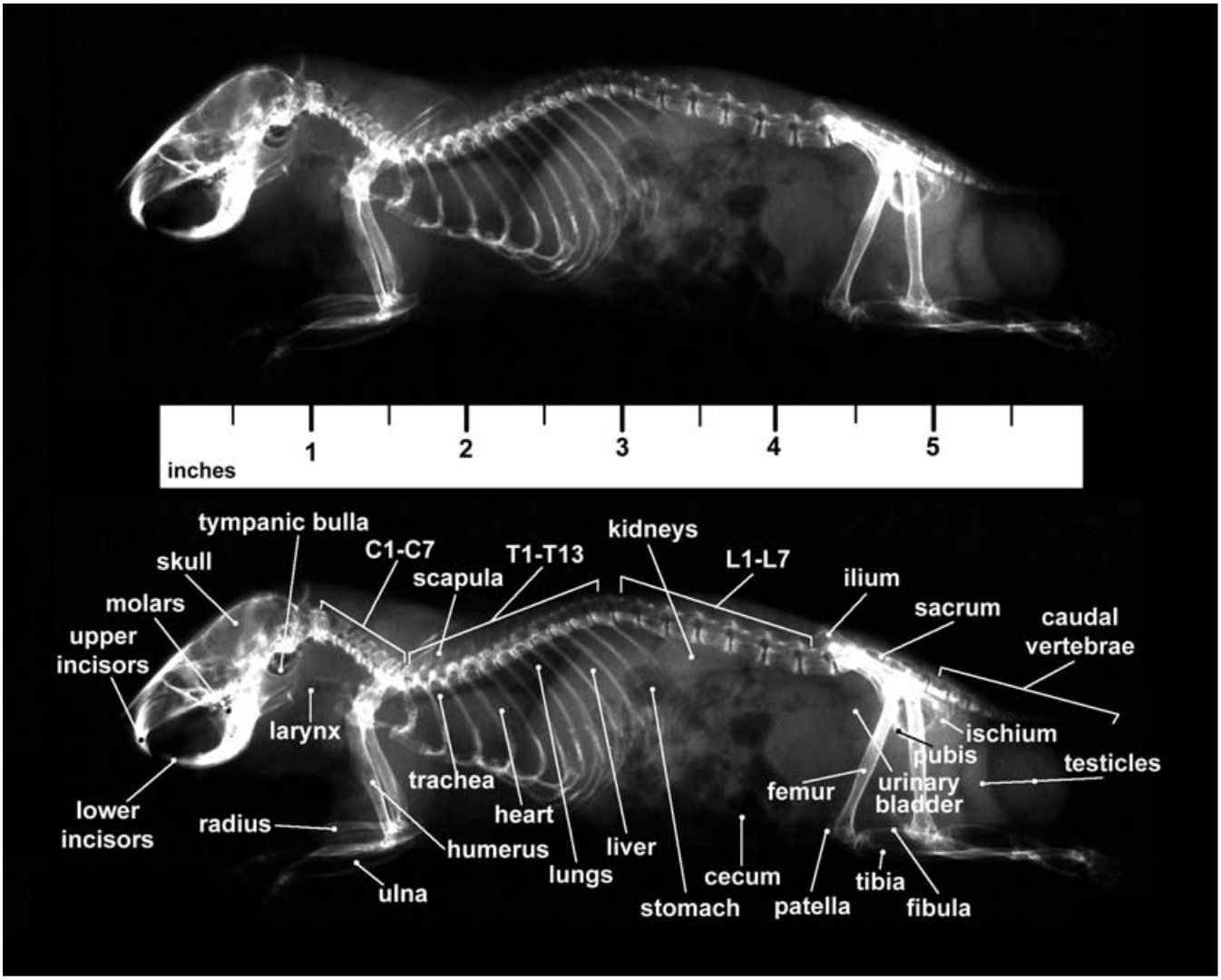


Normal radiologic anatomy of a golden hamster, ventrodorsal position.

Radiology

When possible, radiology should be performed under anesthesia. Nevertheless, the owner's choice or the hamster's clinical condition may not permit sedation. With proper restraint of the patient, radiographs can be taken.

To obtain films of good quality, the fastest possible exposure time should be used (0.02-0.05 sec), and the X-ray beam should be focused precisely on the hamster while avoiding the operator's fingers. The operator must wear lead gloves especially designed to allow finger sensitivity. To reduce the magnification effect and to obtain brighter films, the patient should be placed directly on the film cassette.



Normal radiologic anatomy of a golden hamster, lateral position.

For radiographic positioning, the hamster is scruffed with one hand and the hind feet are held with the other hand.

To focus on a limb, the hamster is scruffed, and the limb is positioned with a small piece of tape (arrow).

In these images, the hands are not protected for illustration purposes only.

Pet Hamster Medicine and Surgery – Part II: Clinical Evaluation and Therapeutics

Notes for Antibiotics

Many common antibiotics are toxic or potentially toxic to hamsters. Penicillin, ampicillin, erythromycin, clindamycin, bacitracin, lincomycin, vancomycin, cefalosporin and gentamicin (administered orally) kill the bacteria normally present in the hamster gut (*Lactobacillus* and *Bacteroides* spp.) and allow overgrowth of *E. coli* and *Clostridium* spp. The common sequelae are enteritis, toxemia and death. Streptomycin and dihydrostreptomycin are lethal, causing ascending flaccid paralysis and death.

Formulary for Hamsters[3,5,7,8,10]

AGENT	DOSAGE	ROUTE	INTERVAL	NOTES
Acetylsalicylic acid	240 mg/kg	PO	24 h	
	100-150 mg/kg	PO	4 h	
Acepromazine	0.5-1 mg/kg	SC,IM		
Amikacin	5-10 mg/kg	SC,IM	8-12 h	Administer fluid therapy
Amitraz	Solution 0.025%	TOPIC	Every 4 days	Use with high caution Hold hamster to allow absorption and prevent self-licking
Atropine	0.2-0.5 mg/kg	SC,IM		Preanesthesia
	10 mg/kg	SC	Repeat every 20 min up to effect	In case of organophosphate toxicity
Buprenorphine	0.5 mg/kg	SC	8 h	
Cephaloridine	10-25 mg/kg	IM	24 h	
Cimetidine	5-10 mg/kg	PO,SC,IM	6-12 h	
Chloramphenicol (palmitate)	50 mg/kg	PO	8 h	
Chloramphenicol (succinate)	30 mg/kg	IM,IP,SC,IV	12 h	
Ciprofloxacin	10-20 mg/kg	PO	12 h	
Dexamethasone	0.5 mg/kg	SC,IM,IP	12-24 h	
	4-5 mg/kg	SC,IM,IP		Shock
Diazepam	3-5 mg/kg	IM,IP		
Doxapram	5-10 mg/kg	IP,IV,IO		To effect
Doxycycline	2.5 mg/kg	PO	12 h	
Enilconazole	0.2-0.5%	TOPIC	24 h every other day	
Enrofloxacin	5-15 mg/kg	PO,IM	12 h	May cause arthropathies in young Avoid SC injections Use 2.5% for IM injections
Fenbendazole	20-50 mg/kg	PO	24 h x 5 days	
Flunixin meglumine	2.5 mg/kg	SC,IM	12-24 h	
Furosemide	2-5 mg/kg	SC,IM	12 h	
Gentamicin	3-5 mg/kg	SC,IM	8-24 h	
Griseofulvin	25-50 mg/kg	PO	24 h	Can cause diarrhea, anorexia
Ibuprofen	280 mg/kg	PO		Pre-surgery
	70 mg/kg	PO		Post-surgery
Isoflurane	5%	Inhalant	To effect	Anesthesia induction
	2-3%	Inhalant	To effect	Anesthesia maintenance
Ketamine	40 mg/kg	IM		Can cause muscle necrosis Dilute 2.5% maximum Mild sedation
	40-150 mg/kg	IM		Deep sedation, not analgesic
Ketamine/acepromazine	50-150 mg/kg+ 0.5-1.0 mg/kg	IM		Anesthesia
Ketamine/diazepam	50-150 mg/kg+ 2.5-5.0 mg/kg	IM		Anesthesia
Ketamine/medetomidine	10 mg/kg+ 0.1 mg/kg	IM		Anesthesia
Ketamine/xylazine	50-100 mg/kg+ 5 mg/kg*	IM		Anesthesia
Ketoconazole	10 mg/kg	PO	24 h	
Lactated Ringer's solution	10-25 ml/kg	SC,IV,IP,IO	Divide among 24 h	
Meperidine	20 mg/kg	SC,IM	2-3 h	
Metronidazolo	20-60 mg/kg	PO	8-12 h	
NaCL solution	10-25 ml/kg	SC,IV,IP,IO	Divide among 24 h	
Naloxone	0.01-0.1 mg/kg	SC,IP	To effect	
Oxytetracycline	10 mg/kg	IM	12 h	
	16 mg/kg	SC	24 h	
Oxytocine	0.2-3 UI/kg	SC,IM	Once	Monitor effect
Pentazocine	10 mg/kg	SC,IM	4 h	
Prednisone	0.5-2 mg/kg	PO,SC,IM,IP	12-24 h	
Tetracycline	10-20 mg/kg	PO	8-12 h	
Tiletamine/zolazepam	50-80 mg/kg	IM		Anethesia
Tiletamine/zolazepam/ xylazine	30 mg/kg+ 10 mg/kg	IM		Anethesia
Trimethoprim/ sulfamethoxazole	15 mg/kg	PO	12 h	
Tylosin	2-8 mg/kg	SC,IM	12 h	Possible toxicity per OS
Vitamin K_1	1-10 mg/kg	IM	8 h	Warfarin poisoning

*In the author's experience 30 mg/kg ketamine + 3 mg/kg xylazine is sufficient for induction of anesthesia for short procedures.

Routes of Drug Administration

■ **Subcutaneous -** This is the easiest route and is recommended for fluids (warmed to body temperature), which are injected under the loose skin of the back. During one treatment, as much as 5 ml may be administered to a golden hamster (or up to 2 ml to a Russian hamster).

Subcutaneous injection site in a hamster.

■ **Intramuscular -** This route is the first choice for antibiotics, particularly because enrofloxacin should not be used subcutaneously. With a secure restraint, a volume of up to 0.1 ml is injected into the posterior semitendinosus/ semimenbranosus muscles.

Intramuscular injection site in a hamster.

■ **Oral -** This route is usually limited to fluids, because powdered tablets are normally stored in the cheek pouches and are not swallowed. Drugs administered in the drinking water are not effective.

■ **Topical -** Application of ointments is not recommended, because the hamster will ingest them from licking, or bedding will stick to the skin. Topical fluids are limited to non-toxic products such as povidone-iodine.

■ **Intravenous -** This route is very difficult, and access is limited to hamsters weighing more than 150 g. The cephalic, saphenous or penile vein is approached. General anesthesia is usually required.

■ **Intraperitoneal -** Although this route is routine in small laboratory rodents, it is not recommended for pet hamsters. The only exception is for fluid therapy during laparotomy.

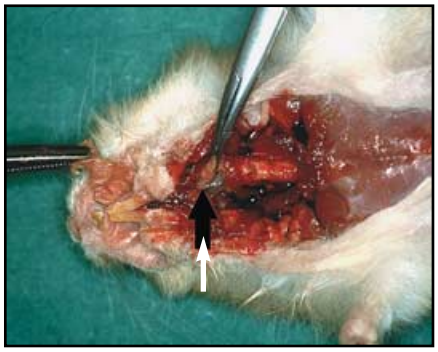
■ **Intraosseous -** With the hamster under anesthesia, a 22-gauge needle may be inserted into the femur or proximal tibia for fluid therapy. The recommended infusion rate is 1 ml/100 g bw/h.

■ **Intracardiac -** These injections are limited to emergencies or euthanasia (under anesthesia).

Necropsy

Necropsy is a very important procedure in hamster medicine and surgery for several reasons:

- It allows the veterinarian to become familiar with hamster anatomy and pathology.
- It improves dexterity for surgery in the living patient.
- It allows the veterinarian to obtain a postmortem diagnosis.



This one-year-old golden hamster died suddenly while it was running on its cage wheel. There was no significant history. Necropsy revealed that a small slice of ham, partially retained in a cheek pouch, had been inhaled (arrow), causing sudden death.

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