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Small Mammal Essentials

Mini Series

Session Two: Common medical conditions and techniques

Kevin Eatwell BVSc (hons) DZooMed (Reptilian) Dip ECZM (Herp) MRCVS
RCVS & ECZM Diplomate in zoological medicine
RCVS recognised specialist in zoo and wildlife medicine
ECZM Recognised Veterinary Specialist in Zoological Medicine (Herpetological)

Urine Collection

Urine may be collected by free catch as in other species. Ferrets can be easily trained to use a litter tray and rodents will often pass urine (and faeces) when restrained or held in a plastic container.

Ferret urine pH is acidic (6-7.5) and varies according to diet. Rodents have an alkaline urine (pH 8.5)

Other collection techniques (cystocentesis, catheterisation) are performed as for cats and dogs. Catheterisation is more difficult in females.

Value	**Gerbil**	**Hamster**	**Mouse**	**Rat**
Urine volume (mls/day)	< 4	5 – 10	0.5 – 2.5	13 – 23
Appearance	Clear yellow	Turbid yellow to milky	Turbid yellow to milky	Turbid yellow to milky
S.G	Very highly concentrated	1.014 - 1.060	1.034 – 1.058	1.022 – 1.070
pH	6.5 – 7.5	5 – 8.5	7.5 – 8.5	7.5 – 8.5
Glucose	Neg	Neg	Neg	Neg
Bilirubin	Neg	Neg	Neg	Neg
Protein	Neg	Proteinuria can be normal	Proteinuria can be normal	Proteinuria can be normal
Ketones	Neg	Trace	Trace	Trace

Value	**Guinea Pig**	**Chinchilla**	**Degu**	**Ferret**
Appearance	Opaque cream or yellow	Turbid yellow to amber	Yellow to orange	
S.G	< 1.050	> 1.045	1.123	
pH	8 – 9	8.5	8.5	6.5 – 7.5
Glucose	Neg	Neg	Neg	Trace
Bilirubin	Neg	Neg	Neg	Neg
Protein	Neg	Neg	Neg	Trace
Ketones	Neg	Neg	Neg	Neg

Blood Sampling

As for other mammals a maximum of 1% of the animal's body weight may be safely collected. This is equivalent to 1ml per 100g weight.

In ferrets isoflurane anaesthesia results in a reduction in red blood cell count, packed cell volume and haemoglobin concentration, falsifying results. However taking a blood sample immediately reduces the effects otherwise you need to wait for 45 minutes.

Blood sampling sites in the Ferret

Sample Site	Needle gauge	Syringe Size	Approach	Sedation/GA necessary?
Cephalic Vein	25 – 27g	1ml	Restrain as for dogs	Usually
Lateral Saphenous Vein	25 – 27g	1ml	Lateral surface distal hindleg, over hock	Usually
Jugular Vein	23 – 25g	2 – 5ml	Restrain as for cats	Not in docile animals
Cranial Vena Cava	25g	5ml	Dorsal recumbency, insert at thoracic inlet at 30º angle towards contralateral hindleg	Yes

Rodent Blood sampling

Options for blood sampling sites are the saphenous, lateral tail vein, jugular vein and anterior vena cava(hystricomorphs). Cardiac puncture under general anaesthesia is only recommended for euthanasia.

1ml from a 100g animal can safely be withdrawn. Less should be taken is the animal is severely debilitated.

Specialist restraint devices are available for rats and mice (tail)

Species	Av. adult body weight (g)	Av. adult blood volume (ml)	Maximum sample volume (ml)	Route
Mouse	25 - 40	2.5	0.25	Lateral tail vein Cheek vein Saphenous vein
Gerbil/hamster	85 - 150	9	0.5	Lateral tail vein (gerbil) Saphenous vein
Rat	300 - 500	30	3	Lateral tail vein Jugular
Guinea pig Chinchilla	700 - 1200	60	6	Jugular Femoral vein Cephalic vein Anterior vena cava Ear vein

Value	Guinea Pig	Chinchilla	Rat	Ferret
TWCC	6 - 14	6 - 17	5 – 20	4 – 11
Neutrophils %	15 – 60	40 - 55	10 – 50	20 – 50
PCV %	35 – 45	30 - 55	38 - 50	36 – 48
TP	45- 65	38 - 56	56 – 76	45 – 62
Alb	25 - 40	25 - 40	40 – 50	25 – 40
Glucose	3.3 – 6.9	3.3 – 6.1	4.7 – 7.3	4.4 – 6.5
Urea	3 – 10	6 - 16	6.1 - 10	6.4 – 11.4
Creatinine	0 – 77	35 - 120	17 - 70	17.5 – 44
Total Calcium	2.4 – 3.1	1.4 - 3	1.3 – 3.2	2 – 2.4
Phosphorus	1 - 7	1.5 – 2.5	1 – 3.6	1.6 – 2.1
ALT				65 – 128

Nasal Cultures

Deep nasal cultures are often taken in respiratory cases in guinea pigs and rats. These should be obtained under anaesthesia. A fine swab is introduced into the ventral nasal cavity and advanced slowly in a ventro-medial direction. Iatrogenic damage to the nasal turbinates is common. Unless careful, contaminants are common from the external nares. Both sides should be sampled for comparison. A pure single culture is likely to be significant, mixed cultures are likely to represent normal bacterial flora.

Abscess diagnosis and culture technique

Fine needle aspirates of rabbit abscesses may be unsuccessful since pus is thick and caseous. The material at the centre of the abscess is likely to be sterile and best culture results are obtained by culturing the abscess wall or capsule. Sections of tissue give the best culture results rather than capsular swabs.

Faecal Analysis

Faeces should be assessed routinely for size, number and fibrous content, as part of any clinical examination. Coccidiosis may be diagnosed using saturated salt flotation techniques. *Saccharomyces* yeasts are commonly seen on faecal microscopy. These are normal symbiotic inhabitants of the caecum in healthy rabbits, however they may been seen in excess and are thought to cause soft stools following oral antibiotics.

Hair plucks and skin scrapes

Acetate strip microscopy is used to diagnose *Cheyletiella* and *Listrophorus* mites. Deep skin scrapes are used to diagnose *Sarcoptes, Notoedres* and *Demodex* mite infections, which are all rare in rabbits. Microscopic examination of crusts from the pinnae is used to demonstrate *Psoroptes cuniculi* mites.

Radiography

Sedation or anaesthesia are often required in ferrets and rodents.

In ferrets the thorax is long and thin and the heart is positioned between the 6^{th} and 8^{th} rib with the apex to the left of midline. On radiographs the cardiac shadow does not contact the diaphragm or the sternum normally. The ligament between the diaphragm and the heart contains fat and may be misinterpreted as cardiac enlargement. The mediastinum may contain large amounts of fat and this may make interpretation of thoracic radiographs difficult. Abdominal radiographs may be interpreted as in dogs and cats. Male ferrets have a J-shaped os penis, which is evident on abdominal radiographs.

Interpretation - myomorphs

- Abdomen seems disproportionately large in relation to thorax
- Hamster has two parts to stomach
- Caecum in left caudal abdomen
- Gas-filled loops in enteritis
- Testes can be retracted; large fat body projects into abdome
- Os penis in rats and mice
- Heart fills cranial and ventral thorax, overlain by forelimbs
- Cardiac enlargement in hamsters- endocarditis
- Bronchial pattern common in older animals

Interpretation - hystricomorphs

- Abdomen mainly filled with LI and sacculated caecum (only prox third in chinchillas)
- Stomach small and less ingesta than rabbits
- Urolithiasis common
- Cystic ovarian disease in guinea pigs and gerbils common
- Thorax small
- Heart fills cranioventral area, cannot see cranial lung lobes
- Os penis
- Testes in inguinal region in chinchillas and large fat body

Skull radiographs are essential in diagnosis and prognosis of dental and ocular disease.
Chinchillas have very large tympanic bullae

Ultrasonography

Ultrasonography is an extremely useful diagnostic tool in small mammals. The techniques used are as for cats and dogs. Care should be taken if the animal is sedated or large areas are clipped that the animal does not become hypothermic. A 5 or 7.5MHz sector scanner may be used. Ultrasound is of particular use for the diagnosis of heart, urinary and reproductive disease. Gastrointestinal disease can be harder to identify due to the gaseous distention in some species.

Computerised Tomography

This is far superior to radiography and does not require sedation in some animals. In others a very brief anaesthetic or sedation will allow detailed imaging to be performed. CT is useful for bony abnormalities and also for soft-tissue protected by bone such as neural tissue. It is of great use in imaging skulls of rabbits in the assessment of dental disease.

Magnetic Resonance Imaging

The main drawback of MRI is those of expense and access to equipment. In addition it can be a lengthy process and will require anaesthesia and remote monitoring. Typically MRI is only indicated should CT fail to give a diagnosis. MRI has greater sensitivity for subtle soft-tissue types than radiography, ultrasonography or CT, but is not suitable for bone imaging.

Common conditions of ferrets and rodents

Ferrets

Endocrine disease

Hyperoestrogenism

This is probably the most common endocrine condition encountered in practice in ferrets in the United Kingdom, in the author's experience. The normal breeding season for ferrets is between March and September, during which time females are seasonally monoestrus with induced ovulation. Ovulation occurs approximately 30-40 hours following mating. If unmated or not stimulated to ovulate, then as many as 50% of females may develop aplastic anaemia after prolonged oestrus (up to six months). High levels of oestrogen lead to oestrogen suppression of the bone marrow and resulting anaemia with pancytopaenia. Other causes of hyperoestrogenism include, rarely an ovarian remnant following ovariohysterectomy, or more commonly, adrenal neoplasia. Pseudopregnancy following a sterile mating has been recorded in ferrets.

Clinical signs include swelling of the vulva (indicative of oestrus), vulval discharge, weakness, anorexia, pallor of the mucus membranes, systolic murmurs, weak pulses, melaena, alopecia over the tail base, ecchymoses and petechiation of the mucus membranes and skin, posterior paresis (due to haemorrhagic myelomalacia) and systemic infections secondary to leukopaenia.

Diagnosis is based on history, clinical signs and haematology. Treatment with supportive care and a cessation of oestrus is indicated. Supportive care with intravenous fluids, syringe feeding, iron and vitamin B supplementation and prophylactic antibiotics should be commenced. A blood transfusion is indicated if the packed cell volume (PCV) is less than 15%. Normal PCV values in ferrets range from 46-61%. Blood groups have not been demonstrated in ferrets and therefore multiple transfusions from the same donor or a variety of donors without cross matching may be carried out without reactions occurring. With a PCV between 15-25% the prognosis is still poor since this value often continues to decrease over time. If greater than 25%, cessation of oestrus may be curative. Ovariohysterectomy is often too risky in such debilitated animals and human chorionic gonadotrophin has been successfully used instead at 100IU by intramuscular injection. The injection is repeated after 7 days if signs of oestrus are still apparent. Gonadotrophin-releasing hormone has also been used at 20ug dose intramuscular or subcutaneous injection, repeated after 1-2 weeks.

This condition is easily prevented in female ferrets by mating with a vasectomised male, or by use of proligestone ('Delvosteron' - Intervet UK) subcutaneous injection, or gonadotrophin agonists such as delslorelin (now licensed and preferred option) prior to the onset of the breeding season.

Hyperadrenocorticism, also referred to as adrenocortical disease, or adrenal gland disease, is considered to be one of the most common diseases in ferrets. This is a conditions of neutered ferrets. Hyperadrenocorticism in ferrets is different from Cushing’s disease in dogs and cats. In the latter species elevated plasma cortisol concentrations are characteristic, while in ferrets, plasma androstenedione, 17-hydroxyprogesterone and oestradiol concentrations are increased. In approximately 85% of ferrets with hyperadrenocorticism, one adrenal gland is enlarged without atrophy of the contralateral adrenal gland, while in the remaining 15% of cases there is bilateral enlargement. After unilateral adrenalectomy in the case of unilateral enlargement, the disease may recur due to enlargement of the contralateral adrenal gland. Histological changes of the adrenals

range from (nodular) hyperplasia to adenoma and adenocarcinoma. The histological diagnosis, however, does not provide any prognostic information. No functional pituitary tumours have been found in ferrets with hyperadrenocorticism.

Aetiology

Neutering of ferrets removes the negative feedback from the gonads on the HPA. As a result LH and FSH continue to be produced and persistently stimulate the adrenal glands resulting in adrenocortical hyperplasia and tumour formation. Strong support for this hypothesis may be found in the fact that the depot GnRH agonists, leuprolide acetate and deslorelin, can be used successfully to treat ferrets with hyperadrenocorticism. Progression to disease can be seen approximately 3.5 years after neutering.

Clinical signs

The most prominent signs of hyperadrenocorticism in ferrets are symmetrical alopecia, vulvar swelling in neutered jills, recurrence of sexual behaviour after neutering in hobs, and pruritus. The skin itself is usually not affected, although some excoriations may be seen. The alopecia usually begins in spring, which coincides with the start of the breeding season, and may disappear without treatment. The next year the alopecia usually returns but may not resolve spontaneously at the end of the breeding season. Other concurrent signs include urinary obstruction in males, due to peri-prostatic or peri-urethral cysts, and prostatic enlargement. Occasionally mammary gland enlargement in jills is also seen.

Diagnosis

Clinical signs are the most important tool in diagnosing hyperadrenocorticism in ferrets. A serum adrenal panel can be used which consists of androstenedione, oestradiol, and 17-hydroxyprogesterone. Elevation of one or more of these hormones is considered diagnostic for active gonadal tissue. This test does not differentiate between hyperadrenocorticism, ovarian remnants or an entire animal.

An abdominal ultrasonographic examination is one of the most useful tools in the diagnosis of hyperadrenocorticism, enabling determination if one or both adrenal glands are affected, or if an ovarian remnant is present. To be able to distinguish an adrenal gland from an abdominal lymph node specific landmarks need to be used. The left adrenal gland is located ventrolateral to the aorta, at the level of and/or immediately caudal to the origin of the cranial mesenteric artery. The right adrenal gland is located more cranial than the left, and is attached to the dorsolateral surface of the caudal vena cava, at the level of and/or immediately cranial to the origin of the cranial mesenteric artery, and lies adjacent to the caudomedial aspect of the caudate process of the caudate liver lobe. Locating these structures during an ultrasonographic examination enables visualisation of the adrenal glands in nearly 100% of cases. The adrenal glands of ferrets with hyperadrenocorticism have a significantly increased thickness (> 3.9 mm), a rounded appearance, a heterogeneous structure, an increased echogenicity, and sometimes contain signs of mineralization.

The most important differential diagnoses include a non-ovariectomized female or presence of active remnant ovaries.

Treatment

The treatment of choice is surgical. The left adrenal gland can be fairly easily removed but resection of the right adrenal gland is more difficult due to its dorsolateral attachment to the caudal *vena cava* and close proximity to the liver. During resection, either a part of the adrenal needs to be left attached to the *vena cava*, or part of the wall of the vein has to be removed. Some veterinarians have ligated the caudal *Vena cava*, but there is a risk of hypertension distal to ligation which may lead to acute kidney failure. In case of bilateral adrenocortical tumours different surgical protocols have been proposed. Some advise to remove the largest adrenal gland and part of the other affected gland.

Others advise to remove both adrenal glands. When removing both glands there is a chance of inducing an Addisonian crisis.

Different medical treatments have been proposed for hyperadrenocorticism in ferrets. The most effective drugs to date are the depot GnRH-agonists. Deslorelin implants (Suprelorin®, Virbac) are now commercially available and are the current treatment of choice. Depot GnRH-agonists work because hormones produced by the hypothalamus and pituitary gland are released in a pulsatile fashion. For the release of gonadotrophins a pulsatile release of GnRH is necessary. By giving an implant with a GnRH-agonist this pulsatile release is blocked, resulting in a single increased release of gonadotrophins followed by baseline concentrations. As a result, there is a cessation of hormone secretion by the adrenal glands and disappearance of clinical signs. However, the tumour does not decrease in size and may continue to grow, despite the masking of clinical signs.

Insulinoma

These tumours occur commonly in middle-aged ferrets. The beta islet cells of the pancreas are affected, resulting in an increase in insulin production and clinical signs associated with hypoglycaemia. In affected animals, the feedback mechanism to counteract this decrease in blood glucose levels by the release of glucagon, cortisol, adrenaline and growth hormone, is inhibited.

Clinical signs associated with this neoplasm may be acute in onset or chronic (manifesting over weeks or months). In acute cases clinical signs include collapse, recumbency, depression, hypersalivation and a 'glassy-eyed' appearance. More chronic cases manifest as gradual weakness, particularly of the hind limbs, lethargy, ataxia, with or without weight loss and reduced appetite.

Diagnosis is based on history, clinical signs, low blood glucose levels (care should be taken when recording a fasting level) and a high or normal blood insulin level. Blood glucose levels lower than 3.89mmol/L are suggestive, with comatosed cases having levels between 1.11-2.22mmol/L (see table below). Biochemistry may show elevation of alanine aminotransferase and aspartate aminotransferase levels and haematology may show leucocytosis, monocytosis and neutrophilia. Other diagnostic tests include radiography (although this is often unremarkable) and abdominal ultrasonography, with visualisation of the pancreas.

Treatment may be surgical or medical in nature, although neither is likely to be curative. Lifespan post-diagnosis and treatment averages between 6-24 months. Surgical treatment is indicated in younger ferrets or those with concurrent adrenal disease. Surgery is often not curative, but is aimed at prolonging life span post-diagnosis. Longer survival times have been associated with surgical therapy as opposed to medical. A nodulectomy or partial pancreatectomy is carried out. Metastases are common, predominately involving the local lymph nodes, spleen and liver. Prior to surgery ferrets are fasted only for a short period (3 - 10 hours) and intravenous maintenance fluid therapy commenced with 5% dextrose solution. Blood glucose levels should be monitored before, during, and after the operation, and for several days following surgery. Recurrence of hypoglycaemic episodes is common (on average 2-6 months after surgery) and so cases should be monitored regularly. It should be noted that this is usually a progressive disease and is frequently fatal, progressing to islet cell carcinoma and metastatic spread.

Medical therapy consists of oral prednisolone or diazoxide together or singly. Mild cases should be started on 0.5 - 2mg/kg prednisolone by mouth twice daily, with regular monitoring of blood glucose levels and gradual increases in dose until clinical signs are reduced. In cases, which are non-responsive to prednisolone, Diazoxide can be given at 5 - 10 mg/kg by mouth twice daily. Side effects include anorexia and vomiting. This drug is a benzothiadiazine derivative, which inhibits insulin release, increases gluconeogenesis and glycogenolysis, and decreases uptake of glucose by cells. Ferrets should be fed regularly with high-protein, high-fat diets (dried ferret food, cooked meat). Foods with high sugar or carbohydrate levels should be avoided. Snacks should be fed after periods of

sleep, when the ferret becomes more active, to coincide with when blood glucose levels are low and hypoglycaemia is more likely to occur.

Rodent respiratory diseases

Respiratory disease is one of the most common presenting sign in pet rodents. Clinical signs include nasal discharge, sneezing, dyspnoea, "rattling" respiratory noise, coughing. In severe cases cyanosis will occur. Rodents are not able to mouth breathe. A red oculonasal discharge is not blood but a porphyrin-stained secretion from the Harderian gland that occurs with any stress/illness. It is easily visible in albino animals Underlying chronic respiratory disease is probably the reason for many anaesthetic deaths in these species.

In **rats and mice** *Mycoplasma pulmonis* is the commonest cause of respiratory disease.
Diagnosis is on clinical signs and radiography. Treatment is based on appropriate antibiosis, preferably after culture and sensitivity of nasal swabs or tracheal washes. Supportive treatment is required in severe cases, including oxygen therapy nebulisation with mucolytics (eg N-acetylcysteine, bromhexine), bronchodilators and antibiotics.

In **guinea-pigs** *Bordetella bronchiseptica* is the most common causes of bacterial "snuffles" (rhinitis, sinusitis) and pneumonia. It can also cause otitis media and interna, abscesses and metritis. Other agents that can cause pneumonia in guinea pigs and chinchillas are *Klebsiella*, *Streptococcus*, *Moraxella* and *Pseudomonas*. Anorexia and depression will occur in severe cases. Bordetella is often present in symptomless carriers, and overt disease is usually **stress-related**. Be aware if mixing rabbits and guinea pigs that *Bordetella* is often carried by rabbits and is not pathogenic in this species, but is pathogenic to guinea pigs.

Dental disease in hystrichomorphs.

Dental disease is a very common reason for presentation of a guinea pig, chinchilla or degu to the veterinary surgeon, although this fact may not be immediately apparent. Anorexia, weight loss, facial abscesses, lack of grooming and caecotrophy should all alert the practitioner to the possibility of dental disease, and a full dental examination should be carried out.

The aetiology of the disease is similar to that seen in rabbits and the majority of cases are caused by lack of dental attrition due top insufficient fibre in the diet, although there does seem to be a genetic component involved in chinchillas.

Dental Anatomy and Physiology

Dental Formula : 2 × I 1 / 1 C 0 / 0 P 1 / 1 M 3 / 3

There is a diastema between the incisors and premolar teeth. The premolar teeth are similar in form to the molar teeth, and are usually described together as the ‘cheek teeth’. All teeth grow continuously and never form anatomical roots. Roots are more correctly described as “reserve crowns”.

All teeth continuously erupt. In the hystrichomorphs the mandible is wider than the maxilla and the occlusal plane is 30 degrees. Overgrowth typically occurs laterally on the maxillary arcades and towards the tongue on the mandibular arcades. In guinea pigs this is often reflected in the tongue being trapped whereas in chinchillas gum and tongue trauma are more typical.

Diagnosis and treatment/management are the same as for rabbits (crown reduction using a dental burr, dietary change etc.), and long term pain relief is an important part of management.
The author uses meloxicam and has treated individuals for periods of over 3-4 years with no apparent adverse effects. Abscessation due to dental disease is less common in these species.

In myomorphs incisor overgrowth is common, although the lower incisors are longer than you think.

Gastrointestinal ileus.

Commonly seen due to dietary indiscretion, dehydration, stress and due to poor diet. Clinical signs are anorexia, abdominal pain and reduce faecal output. Treatment includes radiographic assessment and treatment with analgesia and prokinetics. Genuine blockages are unusual in these species but other underlying abdominal disease is possible.

Urinary tract disease.

Particularly common in Guinea pigs. Guinea pigs are prone to the formation of urinary calculi, with large stones often filling the entire bladder. They can however cause obstructions in the renal pelvis, ureters, bladder and urethra. Although ultrasound is most informative in terms of evaluating renal function and hydronephrosis, uroliths are always calcium dense and radiographically apparent.

A bacterial cystitis can contribute to the disease, with the bacteria forming nidi around which calcium is deposited.

Treatment involves surgical removal of the calculi via cystotomy, antibiotics such as TMPS, analgesia and other agents such as glucosamine and vitamin C.

Myomorphic rodent Skin diseases

Ectoparasites.

Fur mites are common in mice, especially when kept in large colonies. The three species found are Myobia musculi, Myocoptes musculinus and Radfordia affinis. Pruritus, leading to alopecia and ulceration caused by self-trauma, are seen to varying degrees. In some mice even heavy infestations can be inapparent. Lesions are usually found around the head, neck, thorax and flanks. Some strains of mice are believed to have an allergic response to Myobia and exposure to very few mites will trigger hypersensitivity and severe self-trauma. Treatment is with ivermectin every 8-10 days for two to three doses.

Radfordia ensifera is the rat fur mite, and causes pruritus around the head and shoulders leading to self-inflicted scabby lesions.

Notedres muris is a burrowing mite that is reportedly rare but quite commonly encountered in pet rats by the author. Warty, papular lesions are seen on the pinnae, nose and tail, and occasionally on the limbs and genitalia. Diagnosis is by deep skin scrapings or biopsy.

Demodex is the most common ectoparasite of the hamster and is found in skin scrapings of normal animals. Transmission occurs from mother to young during suckling. Demodex criceti (short and fat-bodied) inhabits the keratin and pits of the epidermal surface and Demodex aurati (cigar-shaped) inhabits the hair follicles. The life cycle is thought to take 10-15 days. Predisposing factors for development of overt disease are concurrent disease, immunosuppression or ageing. Clinical signs include alopecia and dry scaly skin on dorsal thorax and lumbar area. Pruritus is not usually present. Diagnosis is made on the basis of skin scrapes. Treatment is with amitraz (diluted to 100 ppm, once weekly until 4 weeks after skin scrapings are negative) or ivermectin or selamectin. It is important to be aware that the clinical disease is indicative of an underlying problem, and this should be addressed where possible. Other mites include Notoedres notoedres the hamster ear mite.

Ulcerative pododermatitis on the plantar surface of the hind feet is occasionally seen in rats. Obesity, poor cage hygiene or wire mesh floors are contributory factors. Erythema and thickening of the footpad, followed by ulceration and secondary bacterial infection is seen. Osteomyelitis can occur in severe cases. Treatment is often unrewarding and involves addressing the underlying cause, systemic antibiotics, non-steroidal anti-inflammatory and analgesia. Some rats will tolerate dressings well but many will rapidly chew them off.

Nasal dermatitis ('sore nose', 'facial dermatitis') is common in gerbils, particularly sexually mature group housed animals which may be stressed by overcrowding and high humidity levels. Lesions start as small focal areas of alopecia and crusting around the external nares and may progress to involve the face, medial paws and abdomen with associated alopecia and dermatitis. Severe infection may be associated with debility and mortality. Hypersecretion of the Harderian gland results in accumulation of porphyrin pigment around the nares. This is irritant and may lead to self-trauma and secondary staphylococcal infection. Digging through abrasive bedding could be a predisposing factor. Diagnosis is based on clinical signs, bacterial culture and cytology of impression smears. Harderian gland secretions may increase with stress. Improving husbandry, environmental temperature and humidity (to less than 50%) will help resolve this problem. Provision of a sand bath will help improve fur quality and encourage grooming. Topical or systemic antibiotic treatment is indicated.

Barbering is common in groups of mice, especially males, where the dominant mouse chews the hair of sub-ordinates without causing skin damage. Treatment is by reducing stocking density, removing the offending individual (although another mouse often takes over this role) and enriching the environment with more bedding and cage furniture.

Hyperadrenocorticism in hamsters

In hamsters both primary hyperadrenocorticism (due to neoplastic changes of the adrenal cortex) and secondary hyperadrenocorticism (due to excess ACTH secretion secondary to a functional pituitary tumour) has been reported (12,13). Iatrogenic Cushings may also occur following glucocorticoid therapy. This condition is commonest in males and older animals, with adrenocortical adenoma being one of the most common reported benign neoplasms in the Syrian hamster. Hyperadrenocorticism is associated with bilateral symmetrical alopecia of the flanks and lateral thigh area, thinning and hyperpigmentation of the skin, polydypsia, polyuria and polyphagia. Changes in behaviour may also be noted.

Skin scrapes and hair plucks should be examined and cultured to rule out ectoparasites and dermatophytes. A tentative diagnosis may be made on the basis of history, clinical examination, with or without elevated blood cortisol levels. Ultrasonography of the adrenal gland may demonstrate enlargement or abnormalities. Practical problems occur due to the volume of blood needed to perform these diagnostic tests and the maximum volume which may be safely taken (10% of circulating blood volume, 1% of total body weight). Exact treatment of these cases may be difficult.

Neoplasia

Gerbils have a large ventral abdominal sebaceous gland, which is used in territorial marking and scent identification of pups. Size is androgen dependent, being larger in males. The gland may become inflamed and infected with staphylococcal and streptococcal bacteria, appearing reddened and ulcerated. Early neoplastic changes may appear similar and should be considered, particularly in older animals. Treatment is using topical or systemic antibiotics. If non-responsive, total gland excision is recommended, since neoplasia is common.

Melanomas and melanocytomas are the most frequently reported cutaneous neoplasm. A higher incidence occurs in males. Melanomas may be melanotic (bluish-black) or amelanotic (grey-white). Epitheliotropic lymphoma (mycosis fungoides) is the second most common cutaneous neoplasm in hamsters. Clinical signs include alopecia, pruritus and flaky skin to cutaneous plaques and nodules, which may become ulcerated and crusted. Diagnosis is by biopsy and euthanasia is recommended.

Hystrichomorphic rodents

Trixacarus caviae causing sarcoptic mange is the most significant ectoparasite of the guinea pig. The mite causes intense pruritus leading to severe self-trauma, and in some cases, fitting. Abortion and foetal resorption may be seen in pregnant animals Lesions are seen on the shoulders, dorsum and flanks. Secondary bacterial infection is common. Chronic infection leads to lichenification and

hyperpigmentation, crusts, scales and alopecia. A stressor such as old age often triggers clinical disease, concurrent disease or hypovitaminosis C. The mite can cause dermatitis in humans.

Diagnosis is by skin scrapes, and treatment is with ivermectin. All in-contact animals should be treated and the housing thoroughly cleaned, as the mite can survive for some time off the host.

Gliricola porcelli and Gyropus ovalis are guinea pig lice and are commonly found. Heavy infestations will cause pruritus and alopecia especially around the ears. Diagnosis is by visualisation of lice or nits. Treatment is with ivermectin.

Cheyletiella parasitovorax occasionally produces pruritus and scaling along the dorsum. Treatment is with ivermectin.

Dermatophytosis is common in guinea pigs and is invariably due to Trichophyton mentagrophytes. Non-pruritic scaling and alopecia occur around the face and head, with the dorsum also affected in severe cases. Occasionally, more inflammatory pruritic pustules, papules and crusts occur. Diagnosis is by fur pluck and culture. Treatment is usually itraconazole with environmental control.