At UC Davis, almost one-third of all rabbits brought to the Veterinary Medical Teaching Hospital had evidence of skin disease. Skin disorders in rabbits and rodents can manifest in the form of pruritus, alopecia without pruritus, scaling or nodules. Combinations of one or more of these clinical presentations may be observed in an individual.

Pruritus
Causes for pruritic skin disorders include: parasites (most common), environment (contact, bedding) and internal neoplasia (rare – the author has seen probable cases in pet rats). Pruritus is not always present in the exam room and can be elicited by scraping or rubbing the animal’s skin.

Parasites
Rabbits (Psoroptes cuniculi, fleas: fleas Ctenocephalides sp., Spilopsyllus cuniculi, Sarcoptes scabei), guinea pigs (Trixacarus caviae, Chirodiscoides caviae), hamsters (Notoedres muris), rats and mice (Myobia musculi, Myocoptes musculus, Radfordia ensifera, Notoedres muris, Liponyssus bacoti, Polyplopx spinulosa, Polyplopx serrata).

Various degrees of pruritus will be associated with the dermatoses caused by these parasites. Skin lesions in those cases are often the result of self-inflicted trauma and secondary infections and may include excoriation, exudation, crusting, and alopecia. Some of these are important enough to discuss in greater detail:

Psoroptes cuniculi (rabbit ear mite)
This parasite causes otitis externa and rarely otitis media which can result in neurologic signs. Rabbits will present with head shaking, pruritus of ears and head and/or ear dropping (this may be the initial sign). Pinna and canals will be erythematous and will have a thick crust which is often red-brown in color. Other parts of the body may be rarely affected. Do NOT attempt removal of crusts as this is quite painful !! Use systemic anti-parasiticides, as discussed below. Sarcoptic mange has also been reported in pet rabbits and especially in rabbit colonies.

Trixacarus caviae (guinea pig sarcoptid mite)
*T. caviae* infestation should be considered as the FIRST differential for any pruritic guinea pig. Do NOT rule it out if the cage-mate does not show any clinical signs. Convulsions resembling seizures can be seen in infested guinea pigs due to the intense pruritus and debilitation experienced by some affected animals.

Notoedres muris (hamster and rat sarcoptid mite)
Notoedric acariasis in hamsters affects mainly the ears, face, genitalia and tail. The diagnosis can be made by distribution and characterization of the clinical signs and by performing skin scrapings. Rats affected by notoedric acariasis resemble hamsters clinically, except that they sometimes present with nasal ‘horns’. Frequently the mite can be visualized when performing a skin scrape of this nasal hyperkeratotic lesion.

Lice
Are usually seen in small numbers in rabbits and rodents. Large numbers may indicate an infestation with another skin parasite, or an underlying systemic disease (hypovitaminosis C in Guinea pigs, for example). Polyplopx serrata (mice) and Polyplopx spinulosa (rats) may serve as vectors for Mycoplasma (Haemobartonella) muris, Encephalitozoon cuniculi, and Eperythrozoon coccoides. Diagnoses of these parasitic disorders can be confirmed by finding the parasites on multiple skin scrapings. The use of scalpel blades for skin scraping is to be avoided! Medical grade spatulas are safe and easy-to-use instruments to perform the scrapings. One such spatula is Fisherbrand* Microspatula with Flat-Ended Blade, catalogue number 21-401-20, Fisher Scientific; http://www.fisherscientific.com.

Treatment of epidermal mites and lice
Ivermectin – 0.2 to 0.4 mg/kg q 2 weeks for 2 to 3 treatments PO or SQ. However, ivermectin should not be administered orally to guinea pigs due to difficulties with GI absorption. Specifically for *Notoedres muris* in hamsters and rats: ivermectin 0.5 mg/kg administered q1-2wks PO, SQ or in the form of a pour-on solution for at least 8 weeks is recommended. In rabbits, ivermectin has been used to treat *Cheyletiella* infestations in doses ranging from 0.2-2.1 mg/kg SQ q11 days x 3 or 0.6-2.7 mg/kg PO q10 days x 3.

Selamectin (Revolution®, Pfizer) has been reported as safe and effective in rabbits for the treatment of ear mites when used at the dosage of 6 or 18 mg/kg twice, 28 days apart. It has also been shown to be effective against *Cheyletiella* at 6.2-20.0 mg/kg q2-4 weeks x1-3 as well as at one dose of 12mg/kg. For guinea pigs’ parasites, a selamectin dose of 12mg/kg has been recommended. Selamectin should also be effective in treating lice, but dosages have not been well-researched.

Imidacloprid/moxidectin (Advocate®, Advantage Multi®; Bayer) has also been shown to be effective for ear mites applied 3 times, 30 days apart. A single subcutaneous dose of eprinomectin at 200 or 300 microg/kg was able to eliminate *P. cuniculi* infection.
in rabbits, although topical protocols with this drug have not been as effective. This same product was effective in treating guinea pigs infested with *Gliricola porcelli* with only one application.

Imidacloprid (Advantage®, Bayer) should be effective in treating lice (but not mite) infestation, however, again, dosages have not been well-researched.

Do NOT use fipronil (Frontline®/Frontline® Plus, Merial) in rabbits (or hedgehogs) as its use has been associated with fatalities; there may be adverse effects from the spray form in hedgehogs, which may be due to this species’ predisposition for respiratory problems as well as their tendency to roll up in a ball (putting the nares in close proximity to the sprayed skin).

Topical lime sulfur (Sulfurated Lime, Dechra Overland Park, KS 66211 USA) is an option to manage lice in rats and mice at 1:32 dilution with water.

Fleas: Domestic rabbits are often exposed to fleas *Ctenocephalides sp.* when they share the household with a dog or cat. In pet rabbits housed outside or exposed to wild rabbits, various flea species may be found including the rabbit flea *Spilopsyllus cuniculi*. Infestations of *S. cuniculi* are common in rabbit colonies. The life cycle of this flea is controlled by the hormonal cycle of the host, which explains the sudden proliferation seen on pregnant does and young rabbits. *S. cuniculi* is also important as a vector for myxomatosis. *S. cuniculi* most often bites on the pinnae and face, and may also bite cats and dogs. Pruritus is variable in flea infestation in rabbits, but may be severe. Imidacloprid (Advantage®: Bayer), a topical adulticide, has been shown to be safe and effective in flea control in rabbits, and is licensed for this purpose in the United Kingdom.

**Environmental causes** of pruritus such as contact and bedding are not often seen at the author’s practice as most cases that come to the University have already tried changing the bedding. However, the veterinarian should determine if the pet is exposed to any harsh chemicals, particularly in the cleaning of its cage: an example would be a cage disinfected in undiluted bleach, but not thoroughly washed before placing the animal back in it. In addition, there are anecdotal reports of certain wood shavings (especially cedar) causing contact pruritus or irritation.

**Internal neoplasia** is not a well-documented cause of pruritus but the author has seen a few pruritic rats with internal neoplasia, although the association between the pruritus and neoplasia was not proven, i.e. the neoplasia was not removed/treated to determine if the pruritus would resolve.

**Alopecia without pruritus**

Causes of this clinical presentation include: dermatophytes, barbering, shedding, *Demodex* sp and endocrinopathies.

**Dermatophytes**

The usual dermatophyte species affecting rabbits and rodents are *Trichophyton mentagrophytes*, *Microsporum canis*, and *M. gypseum*. *T. mentagrophytes* is the most common in laboratory colonies, pet shops, etc, but *M. canis* may be more common in house pets. Clinical signs besides alopecia may include scales, crusts and erythema.

**Diagnosis**

Fungal culture (most accurate), direct examination of hair (trichogram) or scales mounted in 10% KOH or mineral oil (often non-diagnostic), Wood’s lamp (only positive in 50% of *M. canis* infections).

**Treatment of dermatophytosis**

- **Itraconazole** 5-10 mg/kg daily, for 1 month, although the drug is probably safe for up to 3 months.
- **Terbinafine** 10mg/kg for 2 to 6 weeks, making a suspension of the terbinafine in water or syrup.
- **Griseofulvin** – 15 to 25 mg/kg PO for 4 weeks. Avoid its use in pregnant animals (teratogenic).
- **Lime sulfur** topical 1:32 dilution with water 2-3 times weekly – can be used as sole treatment or adjunctive.
- **Enilconazole** (Imaveral®, Janssen – not available in USA) 2 times weekly is effective, however, rabbits and rodents are frequent groomers, and thus may ingest too much of the medication.
- Clipping is not recommended due to difficulties and stress. The environment should be disinfected (discard bedding, wash cages in lime sulfur, etc.).

**Shedding/barbering**

Rabbits especially may shed hair normally in uneven patterns, giving the owner and the clinician the impression that there is a pathologic process. The major differential in those cases is dermatophytosis, which should be ruled out with a fungal culture.

Barbering in guinea pigs (when guinea pigs chew each other’s hair) is often associated with a lack of fiber in the diet, and with stress or overcrowding. Occasionally ear chewing will also be seen. The lack of fiber is particularly important in breeding colonies, where both the feeding of the fiber (including hay as well as pellets) as well as the access to it by all animals may impact on the quality of the hair coat.

“Fur slip” in chinchilla – When frightened or stressed this species will shed tufts of hair (fur). It may take 3 to 5 months for hair to regrow.

**Demodicosis**
This is most common in Syrian hamsters (*Mesocricetus auratus*) which have two species: *Demodex aurati* – a long mite that lives in the hair follicle and *Demodex criceti* – a short mite that lives on/in the stratum corneum. Clinical signs are usually non-pruritic alopecia and scales along the back, neck, hindquarters and abdomen. The disease is more commonly seen in older animals and associated with stress, underlying illness or immunosuppression. Infestations with *D. criceti* may be more pruritic. Diagnosis is via skin scrapings: *D. criceti* may be more difficult to find. There is one report of a hamster having both demodicosis (with *D. aurati*) and cutaneous lymphoma.

For completeness, other *Demodex* spp are found on other hamster species such as the Armenian hamster (*Cricetulus migratorius*) with *Demodex cricetuli* and the Chinese striped hamster (*Cricetulus barabensis*) with *Demodex sinocricetuli*.

**Treatment**

*Ivermectin* at 0.3 mg/kg SQ every 7 to 10 days or PO every 24 hours has been reported as effective. Treat until resolved and look for underlying diseases. Topical *lime sulfur* (1:32 dilution with water, twice weekly for 6 treatments) may be effective against the stratum corneum mite, *D. criceti*. There is one report of the topical use of 0.017% coumaphos (!) in the treatment of an unidentified *Demodex* species in a hamster.

**Endocrine**

Endocrine alopecia is most commonly seen in hamsters and guinea pigs.

### Hyperadrenocorticism

Most common in hamsters, both pituitary dependent and adrenal tumor forms have been noted. Besides alopecia, skin hyperpigmentation, polyuria, polydypsia and polyphagia can be seen. Consistently effective treatment has not been well described. A recent report documents this disease in a guinea pig, using salivary cortisol levels before and after ACTH administration, as well as successful treatment with trilostane at 2-4 mg per day.

*Cystic ovaries*: Most common in guinea pigs and associated with hyperestrogenism. Alopecia when present affects the flanks and is symmetrical and bilateral. Enlarged abdomen is a common sign. Age: 18 months to 5 years. Ovariohysterectomy is the preferred method of treatment.

### Scaling and crusting

Causes of scaling and crusting dermatoses include: *Cheyletiella* sp mites, venereal spirochetosis (rabbit syphilis), hypovitaminosis C (guinea pig), sebaceous adenitis, cutaneous lymphoma, and thymoma.

**Cheyletiella sp (non-burrowing mites)**

Cheyletiellosis in rabbits is a very common cause of mild to severe scaly dermatosis. It is zoonotic and contagious to other animal species such as dogs and cats.

Diagnosis is by finding mites on skin scrapings or acetate tape preparations. In a recent article from South Korea, Cheyletiella parasitivorax and Leporacarus gibbus (another, less common, fur mite of rabbits), were found in 80 and 6, respectively, of 140 rabbits. Clinical signs of pruritus and scaling were observed in 17 of 80 and 76 of 80 infested rabbits, respectively.

**Treatment**

*Selamectin* as per treatment for ear mites (*Psoroptes cuniculi*). *Lime sulfur* dips (1:32 dilution with water) 3 to 4 weekly dips is also effective, but messy and cumbersome in rabbits.

**Treponema paralacuniculi**

(formerly, *Treponema cuniculi*) is the organism causing venereal spirochetosis (rabbit syphilis). Clinical signs include crusts, erythema, edema, papules, vesicles, ulcers and proliferative lesions localized to the face and perineum. In one study, lesions were found most frequently around the nose followed by the genitalia, lips, eyelids, and anus. Sneezing was observed in 33% of cases with nasal lesions. In cases of maternally acquired infection, lesions could be initially found mainly on the face. Lesions are painful but not pruritic. The disease may be associated with metritis, abortion and neonatal death. Rabbit syphilis is NOT zoonotic.

Diagnosis is by microscopic visualization of *T. cuniculi* from skin scrapes on dark field microscopy, or special silver stains to demonstrate the organisms on biopsy. Additionally, the serologic tests used to diagnose syphilis in humans can be used.

**Treatment**

*Penicillin G* at 40,000 to 80,000 IU/kg SC, weekly for 3 treatments. It is very important to monitor for signs of associated antibiotic enterotoxemia. Treat all in-contact rabbits. Chloramphenicol has been used successfully at a dosage of 55mg/kg q 12 h for 4 weeks. Another treatment is azithromycin 30 mg/kg/day given orally once or twice daily for 15 days; effectiveness in a large number of rabbits has not yet been reported, but this dose seems to be effective in experimental situations.

**Sebaceous adenitis** has been reported in domestic rabbits as a cause of alopecia and non-pruritic scaly dermatosis. Diagnosis is by biopsy. The author is unaware of a favorable response reported to retinoids or glucocorticoids in the small number of rabbits treated. One report showed sebaceous adenitis and thymoma in the same rabbit. A similar presentation was seen in a rabbit with hepatopatits.
Histopathology showed a cell-poor interface dermatitis (lymphocytic infiltration and apoptotic cells in basal layer of epidermis), absence of sebaceous glands and lymphocytic mural folliculitis. A case report documents a rabbit with sebaceous adenitis that was successfully treated with a combination of cyclosporine and a supplement of medium-chain triglycerides. Another case report showed better success by adding topical application of a shampoo, spray and spot-on containing the ceramide precursor phosophingosine. 

**Cutaneous lymphoma** has been reported in hamsters, rabbits, mice and gerbils. It presents with severe alopecia, erythema and scaling. Prognosis is poor. As noted above, there is one report of a hamster having both demodicosis (with *D. aurati*) and cutaneous lymphoma.17 An early report in rabbits noted a T-cell origin of the lymphocytes invading the epidermis, while a recent review of 25 cutaneous lymphomas in European pet rabbits classified the tumors as diffuse large B cell lymphomas, with 11 tumors exhibiting a T cell-rich B cell subtype.

**Nodular dermatoses**

Causes include: infectious/ulcerative pododermatitis, myxomatosis, mouse pox, trichofolliculoma (and occasionally other neoplasms such as fibromas and squamous cell carcinomas) as well as congenital malformations. In hamsters, multiple trichofolliculomas have been associated with a polyoma virus.

*Pododermatitis* (“Sore Hocks”) has been reported in rabbits and guinea pigs, and noted in rats. It was the most common skin disease noted in a retrospective case study.

**Rabbits**

Ulcerative pododermatitis is a chronic ulcerative granulomatous dermatitis of the metatarsal area seen in mainly in overweight inactive rabbits kept on wet bedding, grid floors, rough cages and/or unsanitary conditions. Hereditary factors are also thought to be involved and Rex rabbits are particularly affected as they lack protective guard hairs. The secondary infectious agent most commonly present is *Staphylococcus aureus*. Lesions are bilateral, in the planar aspect of metatarsal area with a progression of lesions typified by erythema, hyperkeratosis, crusts, pus, necrosis, osteomyelitis and septicemia. The treatment is difficult and based on correction of predisposing conditions, surgical drainage, topical antimicrobials, surgical dressings, and systemic antibiotics (based on culture and sensitivity). Enrofloxacin (5-15 mg/kg subcutaneously once daily) may prove helpful in early cases. Antibiotic-impregnated methylmethacrylate (AIPMMA) beads have been reported as helpful. The earlier this disease is addressed, the better the chances of successful treatment. Pain management may be important; meloxicam (0.1-0.5 mg/kg PO q12-24 h) or tramadol (10mg/kg PO q24h) may be used.

**Guinea pigs**

Ulcerative pododermatitis is relatively common in guinea pigs. As in rabbits, *S aureus* is generally isolated, although *Corynebacterium pyogenes* may also be found. Obesity, poor hygiene, hypovitaminosis C, and wire flooring are all predisposing factors. Lesions are bilateral, on the planar aspects of the metacarpal and metatarsal areas with a progression of erythema, hyperkeratosis, pus, necrosis, osteomyelitis and septicemia. Treatment involves topical antiseptics (silver sulfadiazine or mupirocin may be helpful) and systemic antibiotic therapy (enrofloxacin as noted above) and bandaging, plus addressing the underlying cause. However, treatment is often unsuccessful, and systemic amyloidosis often occurs due to the chronic infection.

**Myxomatosis** is caused by a myxoma virus of the pox virus group, which is transmitted by various arthropod vectors, or through physical transport of the virus. New World rabbits are very resistant to this disease, but Old World rabbits are extremely susceptible (and pet rabbits are Old World rabbits). There are various strains of this virus. Clinical signs in peracute and acute cases are edema of the head, ears, eyelids and genitalia and milky oculonasal discharge. Firm non-pruritic and erythematous nodules (myxomas) are usually associated with less virulent strains and develop at the site of infection. Lethargy, fever and anorexia can be present. Morbidity and mortality are high in pet rabbits, approaching 100%. The incubation period can range from 8 to 21 days. The diagnosis is by the clinical signs, typical microscopic lesions and virus isolation. Supportive treatment, vector control, and a vaccine (not commercially available in the USA) may be offered/discussed with the owner; the prognosis is grave.

*Mouse pox* (infectious ectromelia) is caused by a orthopoxvirus. It is usually observed in colony situations. Transmission: oral-fecal and respiratory routes, skin abrasion and contact with contaminated bedding, serum (an important source of infection in experimental laboratories that use mouse serum products), etc. Clinical signs are small crusts, papules, swellings, ulceration, and necrosis of feet, ear or tail. Mortality and morbidity vary with each outbreak and mice strain. The diagnosis is often made by electron microscopy, immunohistochemistry, animal inoculations, serologic testing, virus isolation, and/or PCR.

References available from the owner upon request