Infectious diseases with a genetic component

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Infectious diseases in general tend to affect those with a compromised immune system or barrier. However, some infectious diseases have a genetic component.

Demodicosis
The classic example is demodicosis. Demodicosis is caused by a proliferation of demodex mites. This mite is a normal inhabitant of mammals skin, but the mite numbers can increase when there is immunosuppression or a hereditary defect of the immune system. Demodicosis can be divided into adult onset and juvenile onset. Adult onset usually has an underlying immuno-suppressive disease or medication implicated. The juvenile form though has strong evidence for a genetic basis. The American college of veterinary dermatologists adopted a resolution in 1981 recommending the neutering of all dogs with generalized demodicosis. Breeds that have been reported are doberman pinschers, chinese shar peis, american staffordshire terriers, dalmatians, english bulldogs, great danes, boston terriers, chihuahuas, boxers, pugs, old english sheepdogs, german shepherd dogs, collies and afghan hounds. In my experience i would add dogo argentinos to the list. The disease can be further differentiated into localized and generalized forms. The localized forms may be self limiting while the generalized forms will require treatment and can be life threatening.

Treatment involves addressing any secondary bacterial or yeast infections and miticidal therapy. Options that are currently available in the us are amitraz dips weekly, oral ivermectin (400 µg/kg po sid) and milbemycin (1.5-2 Mg/kg po sid).

German shepherd dog deep pyoderma
German shepherd dog (gsd) deep pyoderma is a recurrent deep bacterial infection seen in gsd. These dogs are believed to have an inherited defect in the immune system leading to the deep pyoderma. Infections are antibiotic responsive but sepsis may occur. The author has treated two dogs that had positive blood cultures secondary to the deep pyoderma. Many of these dogs require life long antibiotic therapy. German shepherd dogs may be at increased risk for pythiosis and aspergillus infections.

Dermatophytosis
Dermatophytes are well adapted to cats and there are many inapparent carriers. Long haired cats, especially persians may be more prone to infections with dermatophytes and may be more difficult to cure. In dogs there is evidence that dalmatians and poodles may be at increased risk for generalized dermatophytosis.

Treatment should always be undertaken to prevent further environmental contamination, resolve the infections quickly and to a mycological cure. The owners should be warned of the zoonotic potential especially if any family members are immunocompromised. Treatment requires isolating culture positive pets from the rest of the household, cleaning all areas the pets have been, systemic and topical therapy of the pets. Treatment should continue 1 month beyond the second negative fungal culture.

Environmental to reduce reinfection
Chlorine bleach 1:10 dilution on all bleachable surfaces
Steam clean carpets/furniture

Topical on pet to reduce infectivity
Chlorhexidine, miconazole or ketoconazole shampoo
Lime sulfur dips weekly- preferred

Systemic therapy to reduce length of infection
Griseofulvin-micro25-60 mg/kg q12h - ultra 2.5-15 Mg/kg q 12 h-give with a high fat diet
Teratogenic
Bone marrow suppression
Damages microtubules of fungal cells
Itraconazole-5-10 mg/kg q 24 h - preferred
Fluconazole-5-10mg/kg q 24 hrs - generic available in us
Inhibits ergosterol synthesis in fungal cells

Terbinafine (lamisil)10-30 mg/kg/sid
Inhibits ergosterol synth independ of p450
Inhibits squalene epoxidase
Gi, increase liver enzymes
Lufenuron-cats 80-100 mg/kg q 2 wk dogs 80 mg/kg q 2 weeks
Chitin inhibition
Shown to be ineffective (deboer)

Feline dermatophytic mycetoma
An uncommon deep dermal infection in which microsporum canis is usually cultured. This is seen almost exclusively in persian cats.
Firm irregular subcutaneous nodules (5-20 mm) develop and can enlarge and coalesce. Some may ulcerate and ooze.

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Diagnosis is made by biopsying an entire nodule or with a fungal culture. Systemic antifungal therapy for extended periods and debulking may be necessary to resolve the infection.

**Malassezia dermatitis**
A very common infection that is seen secondary to allergic disease but also as a primary hypersensitivity/infection. Basset hounds, west highland white terriers, shih tzus, lhasa apsos and dachshunds may be at increased risk. Diagnosis is made by visualizing the yeast on cytology. Histopathology may miss the yeast as they are usually in the superficial layers and may be lost in processing. These dogs may have other underlying diseases but often are clinically “normal” once the malassezia infection has been addressed and relapse when the yeast numbers increase again. These dogs will require life long antifungal bathing and oral antifungals:
- Ketoconazole 5-10 mg/kg sid
- Fluconazole 10 mg/kg sid
- Itraconazole 10 mg/kg sid

**References/recommended reading**
1. Deboer DJ, Moriello KA, Blum JL, Volk LM. Effects of lufenuron treatment in cats on the establishment and course of microsporum canis infection following exposure to infected cats. *J Am Vet Med Assoc.* 2003; 222(9):1216-20