

Skin Diseases of the Ears and Feet

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Believe it or not, feet and ears have a lot in common when it comes to the causes of skin disease. Both parts of the body are often affected when dogs have more generalized skin diseases, and sometimes ears or feet can be the only major body part affected. The following table shows some of the potential underlying causes for ear or foot disease.

Ear Canals

Parasites

- Ear mites, ticks
- Demodex

Allergies

- Atopic dermatitis
- Food allergy
- Contact allergy to medication

Infections (are secondary)

- Bacteria (Staphylococcus, others)
- Yeast (Malassezia)
- Fungi

Conformation

Feet

Parasites

- Demodex, Sarcoptes
- Hookworm, Leishmania

Allergies

- Atopic dermatitis
- Food allergy
- Contact allergy

Infections (are secondary)

- Bacteria (Staphylococcus, others)
- Yeast (Malassezia)
- Fungi

Conformation

Otitis Externa in Dogs

Why do dogs get ear infections so readily? The anatomy of the ear canal in dogs is very different from our own. They have an L-shaped canal with a vertical component and a horizontal component. (Fig 1, diagram of the canine ear) Anything that causes swelling in the ear canal shuts it down and traps exudates inside. Veterinarians focus on the 3 P's: predisposing factors, primary factors, and perpetuating factors. Predisposing factors are those that set dogs up for problems if they occur. These include conformation (think Cocker spaniels with long ear canals and hair ear flaps that sit tightly on the side of the head or the narrow twisting ear canal of the Pug, the English Bulldog, and the Shar Pei), behavior and function of the dog (swimming, hunting with access to foreign bodies like grass awns), the environment in which the dog lives (increase of ear infections in hot, humid climates), and trauma to the ear (aggressive plucking, cleaning). Primary factors are those that cause the inflammation. These include parasites, foreign bodies, allergies, keratinization disorders (such as we see in Cocker spaniels), and tumors. Perpetuating factors are those that prolong the disease. These include infections as well as the chronic changes (proliferation, calcification) that can occur when inflammation persists.

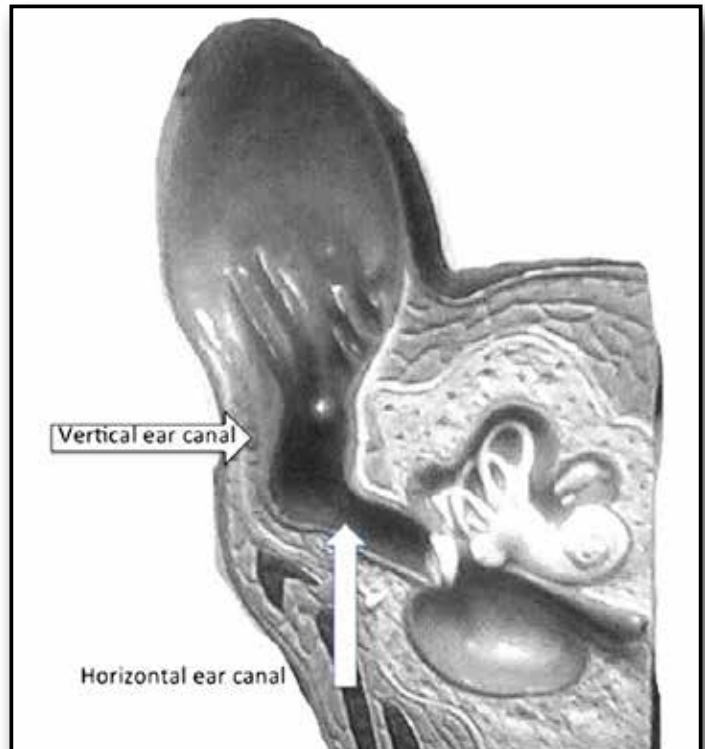


Figure 1: Diagram of the canine ear.

One of the most common primary causes is allergic disease. Allergies often lead to ear infections because they cause inflammation, which leads to swelling of the ear canal. When the ear canal is inflamed it also increases production of ear wax or cerumen. This ear wax is the food on which the bacteria and yeast feed. Over time, dogs can develop allergic reactions to the yeast or bacteria and then the inflammation is made even worse.

The infection may be what we recognize first in our dogs, because it contributes greatly to the itch, discharge, and smell we associate with ear disease. We need to treat the infection but we also have to consider the underlying causes. (Fig 2, allergic otitis with secondary bacterial and yeast infection) If ear infections are unchecked, inflammation persists and it sets our dogs up for anatomic and physiologic changes in their ear canals that makes

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relapse and recurrence more likely. These include narrowing of the ear canal, scarring, inflammatory polyps, and calcification.

In order to manage ear infections effectively, we need to find out what organisms cause it. We can make cytologies by gently swabbing the ear, rolling the exudate onto a glass slide and staining it for microscopic analysis. The results are used to determine how we will treat that infection. For acute infections, we have many topical treatments that can be effective. For chronic infections, we often need to anesthetize dogs first for a thorough cleaning. We can culture the ear to find out what antibiotics will work. Most dogs with severe infections that close off the ear canal will need some steroids to open up the ear and reduce the discharge and pain.

The most common organism causing ear infection is *Malassezia* yeast. (Fig 3, the peanut shaped yeast *Malassezia* found in the ear) Yeast overgrowth is often found in the ears of allergic dogs, and dogs can become allergic to the yeast itself. This creates even more severe itch in dogs. Yeast infections are usually associated with a thick waxy brownish exudate. We recommend gently cleaning the ear with a product like DOUXO Micellar or EpiOtic Advanced first, then using a good antifungal with a steroid topically. Yeast infections tend to recur, so if this becomes a pattern, we recommend regular ear cleaning to help prevent relapse.

The most common bacteria we see infect the ears is *Staphylococcus*, also the most common cause of skin infections. Most of the time, this infection is easy to treat, but in the last 10 years we have recognized that *Staph* spp in dogs, like those in people, can become resistant to the ear medications we commonly use. In those cases a culture and sensitivity is required in order to find the antibiotic that will work.

Pseudomonas aeruginosa is a water-loving gram negative rod that often invades chronically irritated ears, and once entrenched, can be very difficult to eradicate. Chronic *Pseudomonas* infections are often associated with severe pain, swelling of the ear canal, and ulcers. The exudate varies from yellow-green to a thick tarry black. (Fig 4, swab from the ear of a dog with *Pseudomonas* otitis) For these pets, oral steroids for 7-14 days to open up the ear canal without any topical treatment is best. Then we anesthetize these dogs to thoroughly clean out the ear canal and to see if there is exudate in the middle ear. Removing these exudates is critical to resolve the infection. We know that *Pseudomonas* can make a substance called biofilm. Biofilm is a mucus-like substance that surrounds the bacteria to protect it from our antibiotics. We have to remove it before our treatments will work. In many of these patients, we cannot use our commercial ear treatment preparations. We have to determine what will work with culture and sensitivity, and mix up liquid medications that we can use to fill the ear canal.

Rarely we can find fungi in the ears. Most often it is *Aspergillus* spp, and it is usually seen in chronically infected ears treated repeatedly with antibiotics. We identify it by cytology and sometimes culture, and we choose an effective topical antifungal medication for treatment.



Figure 2: Allergic otitis with secondary bacterial and yeast infection.

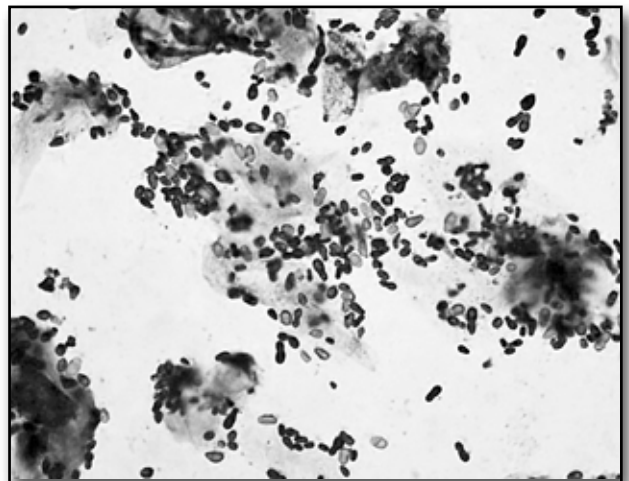


Figure 3: The peanut shaped yeast *Malassezia* found in the ear.

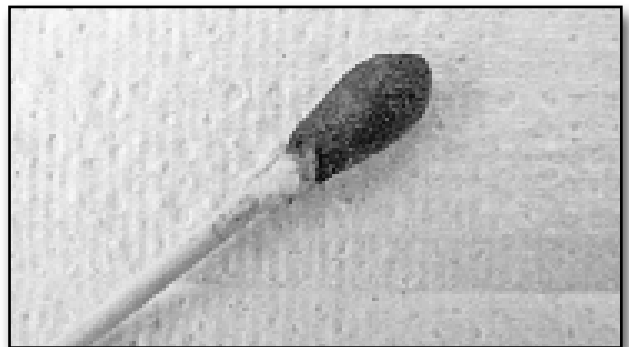


Figure 4: Bacterial pododermatitis secondary to demodicosis in a West Highland White Terrier.

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The three key elements to the successful treatment of any ear infection are:

1. Resolve the inflammation. Inflammation increases the ear secretions which are food for the microbes and inflammation closes down the ear. We use topical and sometimes oral steroids for this purpose.
2. Prevent occlusion or stenosis. If the ear canal is shut down, secretions are entrapped, air circulation is decreased, and we can't get our medications deep into the ear canal. We clean out the exudate before starting treatment and we use steroids.
3. Kill the bugs. For this purpose we use antibiotics and/or antifungal medications, depending on what our cytologies show us.

Once we resolve an infection, we recommend maintenance ear care. We know that infections are secondary and we have to identify and control the underlying causes. Until that is accomplished, gentle maintenance ear care will prevent relapse of infection. Often flushing the ear weekly with a cleaner such as DOUXO Micellar or EpiOtic Advanced will be enough. For some dogs with allergic underlying disease, we can use steroid drops a few times a week to prevent inflammation. The best way to flush a dog's ear is to fill the ear canal with the fluid, then gently massage. They can shake out the excess liquid and then the ear can be gently dried with a cotton ball or soft towel.

While veterinarians often use cotton swabs to clean the ears, we have the advantage of using an otoscope to check and make sure we actually get it out and we are not cramming it further into the ear canal. For at home cleaning, we recommend avoiding the cotton-tipped applicators.

It is very important when we are cleaning ears or treating them that we not transfer infection from one ear to the other. If a flush is used, it is best to avoid touching the tip to the ear to avoid contamination. Old ear treatments and ear flushes should be thrown away as they can become contaminated and re-infect the ears. It is also important to keep in mind that some dogs can develop irritation or allergy associated with the specific medication used. If ears are looking worse after a treatment is started, re-evaluation is very important. Sometimes stopping that particular medication is indicated.

Pododermatitis in Dogs

Pododermatitis, or inflammation of the skin of the feet, is a commonly seen clinical sign in dogs. There are many potential causes, some more common than others.

Common Causes

The most common parasitic disease affecting the feet is demodectic mange. Demodectic mange is associated with hair loss on the feet often associated with hyperpigmentation (increase blackness) of the skin. Sometimes we can see comedones (blackheads) associated with follicular plugging. In some cases the feet are also red, and they can be itchy. More severe itch occurs when bacterial infections occur. (Fig 5, demodicosis and secondary infection in a Westie) The mites within the hair follicles cause enough damage that it is easier for bacteria to invade. Most often we see staphylococcal infections but the gram negative rod *Pseudomonas* can invade too, and it is often associated with deep weeping lesions. Demodectic mange in the feet can take some time to resolve. If it occurs in

young dogs as part of generalized mange, there is a good chance we can cure it. In older dogs, demodectic mange may be secondary to underlying disorders such as Cushing's disease, hypothyroidism, or even cancer. Resolution of the mange requires that the underlying disease be controlled. For some older dogs (Shih Tzus and Westies) adult onset demodicosis may not have an underlying cause. We can't cure it, but we can control it with maintenance therapy. Effective treatments include oral high dose ivermectin (which should NOT be used with Triflexis or Comfortis to avoid serious side effects), and amitraz dips. Some veterinarians like



Figure 5. Demodicosis and secondary infection in a Westie.

to use weekly injections of doramectin. Recently there was a publication suggesting that the new oral flea and tick control product Bravecto can kill Demodex mites, and we are finding similar results with oral Nexgard. If proven to be true, these medications could be very helpful for treatment as well as long term maintenance for prevention of relapse.

Sarcoptic mange is caused by a mite that creates a lot of itch. Unlike demodicosis, it can be hard to find on skin scrapings so we rule it out by treatment. Dogs rarely have scabies only on the feet; there are usually itchy crusted lesions on pressure points and often on ear margins. This is easily treated with some of our flea control medications including Revolution (selamectin) or Advantage Multi (containing moxidectin). Several wild mammals including coyotes, fox, and raccoons can carry this

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mite, and they may be the source of the infestation for dogs not in contact with other infested dogs.

Most dogs with itchy inflamed feet have allergies. (Fig 6, hair loss on the foot of an allergic dog) The most common allergic skin disease affecting the feet is atopic dermatitis, a disease to which certain breeds, including the Westie, are genetically predisposed. Atopic dogs have a skin barrier defect which allows them to absorb their allergens through the skin, so it is not a surprise that these dogs have itchy feet. There is usually redness and hair loss, and continual licking or biting of the feet. Atopic dermatitis is not curable, but it is manageable. We become suspicious of atopic dermatitis based on the breed of dog affected, the early age at which the itchy feet start, and the other parts of the body affected. We use our skin testing or serum allergy testing to pick allergens for an allergy vaccine. Some atopic dogs also have food triggers. Unfortunately there are no accurate diagnostic tests to identify specific food allergens. We continue to rely on a diet trial, restricting what the dog eats to a limited ingredient diet containing a single source of protein to which the dog has not been exposed. We feed this diet for 6-8 weeks. If improvement is seen, we challenge with the old food to see if itch is provoked. If it is, we can do single food challenges to find out what foods to avoid in future.

To successfully manage atopic dermatitis, we take a multimodal approach: we avoid what we can (food triggers, fleas), we use the allergy vaccine to change the abnormal immune system, we control infections, we repair the skin barrier with nutrition and topical lipid therapy, and we control itch, using steroids, cyclosporine (Atopica), or oclacitinib (Apoquel). At home, it can be very helpful to wipe the feet, face, and belly with an unscented baby wipe or a damp washcloth to physically remove the allergens.

The most common cause of bacterial skin infection is *Staphylococcus pseudintermedius*. When infection is found on the feet, it is always secondary to an underlying cause such as allergy. Bathing, sprays, or wipes with chlorhexidine can be very helpful; we often have to use systemic antibiotics as well. We can use cytologies to identify what type of bacteria are present. Because of bacterial resistance, we sometimes have to perform a culture and sensitivity too.

Malassezia yeast is a common cause of itchy feet in dogs and it is nearly always associated with allergic disease. Cytology helps us make this diagnosis and we often treat with an oral antifungal drug (ketoconazole, fluconazole, terbinafine) to reduce itch quickly. Bathing with 3% chlorhexidine or one of the antifungal shampoos (such as Malaseb) can help kill yeast too, and prevent recurrence.

Not So Common Causes of Pododermatitis

Ringworm (dermatophytosis) can affect the feet less commonly. (Fig 7, ringworm or dermatophytosis of the feet) Three different species of dermatophyte fungi cause disease in dogs: *Microsporum canis*, *Microsporum gypseum*, and *Trichophyton* spp. Diagnosis is made by fungal culture or sometimes by biopsy, and we treat most often with a combination of an oral antifungal medication (terbinafine, fluconazole, itraconazole) and topical treatment with an antifungal shampoo or lime sulfur. Dermatophytosis can be contagious between our pets and ourselves, and from animal to animal. *Microsporum gypseum* is unique in that dogs get it from digging or routing in soil; it is not considered contagious to other animals or to people.



FIGURE 6. HAIR LOSS ON THE FOOT OF AN ALLERGIC DOG.



Figure 7. Ringworm or dermatophytosis of the feet.

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FIGURE 8. pemphigus foliaceus of the footpad.

Immune-mediate diseases can affect the feet. A disease called pemphigus foliaceus can cause thick crusts on the footpads as well as other parts of the body; sometimes only the footpads are affected. (Fig 8, pemphigus foliaceus of the footpad) Other immune diseases can cause ulceration of the footpads or skin around the nails. We have to biopsy these lesions to get the specific diagnosis in order to treat these dogs effectively.

Another serious disease causing crusting of the footpads is a metabolic disease called superficial necrolytic dermatitis or hepatocutaneous disease. (Fig 9, hepatocutaneous syndrome) It is associated with pancreatic tumors, diabetes mellitus, Cushing's disease, and certain hepatic diseases. The proposed hypothesis is that these diseases decrease the blood levels of amino acids and erosive, crusting skin lesions develop on the feet, and around mucus membranes. This is a serious disease with a guarded prognosis. We diagnose it by skin biopsy and abdominal ultrasound to identify the specific liver changes or to identify tumors. Treatment involves nutritional supplementation and intravenous amino acid infusions.



Figure 9. Epatocutaneous syndrome.

The dermatology toolkit for diagnosing disease of the feet include skin scrapings, cytology, biopsy, and culture and sensitivity. These tests allow us to make a specific diagnosis and come up with the most appropriate treatment protocol.

There are several things that can be done at home to help sore or itchy feet though. Soaking in cool to tepid water with Epsom salts is very helpful for dogs. If dogs have recurrent yeast infections, vinegar soaks can help kill yeast. White vinegar is mixed with water at 1:2 or 1:3. For bacterial infections, chlorhexidine is the most effective antiseptic we have, so chlorhexidine shampoos and sprays are helpful. Hibiclens is a chlorhexidine wash available at most pharmacies.



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