Allergic Dermatitis, Staying Ahead of the Flare

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Apoquel®, Cytopoint®, Atopica®, steroids, and immunotherapy are available but how do we leverage what we use and when? How do we decide that a change is warranted and why? Allergic skin disease is common and complex. Atopic dermatitis is one of the most common causes of allergic skin disease and management is often complex and multifaceted. In the 90's, our treatments were focused on the use of steroids, antihistamines, antibiotics and flea control. Antihistamines are NOT effective and are likely to be of little or no benefit for treatment of acute flares of atopic dermatitis. On average over 90,000 dogs are prescribed an antihistamine monthly. Then, options for allergy management began to expand with Atopica® for dogs (2003), Atopica® for cats (2011), Apoquel® tablets (2013), Cytopoint® (2016), and Apoquel® Chewable (2023) with more ahead. Isoxazoline class parasiticides arrived in 2013 with Nexgard®

Atopica® and Atopica® for cats (modified cyclosporine) continues to have a valuable place in the management of allergic skin diseases. However, as with every treatment, expectation must be set for the client, as 4-8 weeks may be required to achieve satisfactory clinical benefits. Typically, 5 mg/kg/day is utilized for atopic dermatitis in dogs and 7 mg/kg/day in cats. Doses may be reduced to every other day administration following 4-8 weeks of daily use or upon achieving desired clinical response. Some feline patients will remain controlled at twice a week administration. Modified cyclosporine is an immunosuppressive agent that has been shown to work via suppression of T-helper and T-suppressor cells and inhibition of interleukin-2. During safety studies in cats vomiting, weight loss, diarrhea, anorexia, lethargy, hypersalivation, behavioral disorder, ocular discharge, sneezing, gingivitis, polydipsia were seen. During safety studies in dogs vomiting, diarrhea, persistent otitis externa, urinary tract infection, anorexia, lethargy, gingival hyperplasia, lymphadenopathy were seen.

Interleukin 31 is a key cytokine in neuronal transmission of itch.

Apoquel® and Apoquel® chewable (intracellular action) for dogs 0.4-0.6 mg/kg by mouth every twelve hours for up to 14 days. Then, 0.4-0.6 mg/kg once daily for maintenance. Rapid, typically within 4 hours of administration, pruritus reduction is documented. As the first Janus Kinase inhibitor (JAK), Apoquel revolutionized allergy management for canine patients. Being approved for 12 months of age and older dogs broadens the treatable population. During safety studies in 12-month-old dogs, clinical pathology findings considered to be oclacitinib maleate-related included mild, dose-dependent reduction in hemoglobin, hematocrit, and reticulocyte counts during the twice daily dosing period with decreases in the leukocyte subsets of lymphocytes, eosinophils, and basophils. Total proteins were decreased over time primarily due to the albumin fraction. Apoquel® adverse events >1 but <10 per 10,000. Top 5 side effects: vomiting, lethargy, anorexia, diarrhea, and elevated liver enzymes.

Cytopoint® (extracellular action) is a ready-to-use, preservative free, sterile liquid containing a caninized monoclonal antibody against interleukin-31. It exerts a therapeutic effect by binding to and neutralizing soluble IL-31, inhibiting pruritus and reducing skin lesions. Elimination is via normal protein degradation pathways. Dosed at a minimum dose of 2 mg/kg by subcutaneous injection every 4-8 weeks. Dogs weighing less than 5 pounds, administer 0.09 mls/pound. Injection site itching, injection site discomfort may be seen with low frequency. Cytopoint® 80% of responders responded by day 4. Approved dose in the EU is 1mg/kg q4 weeks, whereas it is 2 mg/kg q 4-8 weeks in the United States. The Cytopoint® 3-month study showed a 65% treatment success with 1st dose, 85% of the responders by 2nd dose and 93% of the responders by day 90.

What about usage?
All pruritic patients that are potentially allergic should be treated empirically for sarcoptic acariasis and in flea endemic regions consistent (high quality) flea control is mandatory for all pets in the home and all those that visit. Not all patients respond to the same treatment regimen. Dividing patients by age helps provide some guidance (<12 months or >12 months). Patients 6 months of age and younger would be limited to Cytopoint®. Patients 6-12 months could be treated with Atopica® or Cytopoint®.

Whereas patients >12 months have options that include Atopica®, Cytopoint®, and Apoquel®. So, we should consider the patients history.

- If the pruritus is nonseasonal, an elimination trial should be considered with Ultamino® and typically Apoquel® or Cytopoint® would be a good consideration as these treatment options provide the potential for rapid reduction in pruritus and discontinuation of treatment to determine if the elimination trial has afforded benefits in pruritus control. If a flare occurs rapid restart of Apoquel® or Cytopoint® is possible to control the flare. Then, depending upon the level of control adjustments may be considered.
- If pruritus is seasonal, considerations are made for Apoquel® or Cytopoint®. However, if Cytopoint® is opted for by the owner based on a desire to minimize oral medication administration; consider Apoquel twice daily for the initial 2-4 days since many will respond within that time. If the patient has an incomplete response to Cytopoint®; they will have Apoquel® on-hand to utilize as needed pending repeat Cytopoint® dosing in one month.
    - Alternatively, if Atopica®/modified cyclosporine is more desirable, consider the use of Apoquel® or Cytopoint® during the initial month while initiating treatment.
- If pruritus control is inadequate with Cytopoint® monthly; consider Apoquel® as needed for break through pruritus.
- If Apoquel® or Cytopoint® is deemed inadequate; consider introduction of Atopica® understanding the duration of time for clinical improvement. Steroid use on a tapering schedule during the initial 4-6 weeks may be necessary in patients with acute or severe pruritus.

Consider whole body issues as you consider treatment options. If ongoing recurrent otitis externa or pedal furunculosis is present while on Apoquel® or Cytopoint®, consider methods to address residual concerns.

Although we have exceptional options currently, we need to remember that these treatments are mechanisms of control for clinical signs. However, these medications do not change the disease. Whereas allergen immunotherapy has the potential to change the course of disease and should be a consideration where deemed feasible. Gabapentin in combination with prednisolone or modified cyclosporine in feline atopic skin syndrome has been shown to be beneficial is a small study at 10-15mg/kg q 12 hours and may be considered.

The early response to treatment is important but lasting control needs to be in the plan. Early intervention is key. Topical therapy is important but is beyond the scope of this discussion. Some of the treatment options discussed are extra-label use.

Immunotherapy in Private Practice, You Can Do It

Immunotherapy is currently our only therapeutic with the capability to afford change in disease progression. The goal is to improve quality of life with better allergy control. Although immunotherapy has historically been left primarily to the dermatologists; this treatment can be successfully utilized in general practice and should be utilized in general practice. However, not every patient will respond if we simply follow the basic immunotherapy administration schedule. Learn how to set expectations properly and how to adjust the dosing regimen for immunotherapy in an individual patient.

Mechanisms of subcutaneous and sublingual/oral immunotherapy

The two most utilized forms of allergen immunotherapy are subcutaneous immunotherapy and sublingual/oral immunotherapy. Over the last decade, substantial developments in allergen immunotherapy have been made in human medicine. Yet there are many unknowns that remain.

Glucocorticosteroids remain as a principal pharmaceutical for allergy management in human medicine for allergy treatment, they effectively treat inflammation without curing the disease. Some of the biggest success stories in allergy management in veterinary medicine have been Apoquel®, Cytopoint®, and Atopica®. Most veterinary practitioners have a relative level of comfort utilizing Apoquel®, Cytopoint®, and Atopica® but when it comes to allergen immunotherapy the comfort ends. Allergen immunotherapy is considered the only treatment option with the promise of healing and induction of long-lasting tolerance, persisting even after discontinuation of therapy. However, allergen immunotherapy has not been adopted to the same degree as pharmacotherapy.

Glucocorticosteroids are efficient but not effective enough and allergy immunotherapy is effective but not efficient enough. One of the difficulties in the management of allergies is the individual variability found in the patient population. Although pharmacotherapy interventions are effective in reducing symptoms and improving the quality of life of most patients, a small proportion of patients do not respond to even high-dose treatments. Allergen immunotherapy should be considered as a concurrent therapeutic option for these patients as well.

Allergen immunotherapy involves the repeated administration of allergens either subcutaneously or orally/sublingually. In human medicine treatment duration is recommended for at least 3 years to confer clinical benefits. Following cessation of treatment allergen immunotherapy is known to confer long—term clinical benefit and tolerance in humans[1][2][3] as well as prevention of disease progression[4][5].

Allergen immunotherapy is the only disease-modifying therapy for IgE-mediated allergies. It is not without limitations including side effects, poor compliance, lack of efficacy in nonresponders, and cost. Side effects are of low frequency in veterinary patients as compared to humans.

Mechanistic studies have allowed a more thorough understanding of the underlying mechanisms of tolerance induced by allergen immunotherapy. Allergen immunotherapy efficacy is associated with dampening of various proinflammatory responses within the innate and adaptive immune system while inducing strong regulatory counterparts. Early evidences reveal differential antibody induction in the two modes of allergen immunotherapy.

Allergen-specific immunotherapy has been used more than 100 years for allergic patients. Subcutaneous immunotherapy and sublingual/oral immunotherapy both seem to be effective. Precise mechanisms of action for allergen immunotherapy remain uncertain.

Both are associated with induction of regulatory T cells, expression of IL-10 and TGF-β1 and secretion of allergen specific IgG4.

Allergen immunotherapy in humans appears to modify the course of allergic disease, by reducing the incidence of new sensitizations. The mechanism behind this remains unclear but likely involve immunologic effects.

Veterinarians receive limited if any training in the use or allergen immunotherapy and as such it is not surprising that allergen immunotherapy use is limited compared to other pharmacotherapies. Allergen immunotherapy can

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[1]Durham SR, Emminger W, Kapp A, de Monchy JG, Rak S, Scadding GK, et al. SQ-standardized sublingual grass immunotherapy: confirmation of disease modification 2 years after 3 years of treatment in a randomized trial. J Allergy Clin Immunol 2012;129:717-25.e5.

[2] Durham SR, Emminger W, Kapp A, Colombo G, de Monchy JG, Rak S, et al. Long-term clinical efficacy in grass pollen-induced rhinoconjunctivitis after treatment with SQ-standardized grass allergy immunotherapy tablet. J Allergy Clin Immunol 2010;125:131-8.e1-7.

[3] Didier A, Worm M, Horak F, Sussman G, de Beaumont O, Le Gall M, et al. Sustained 3-year efficacy of pre- and coseasonal 5-grass-pollen sublingual immunotherapy tablets in patients with grass pollen-induced rhinoconjunctivitis. J Allergy Clin Immunol 2011;128:559-66.

[4] Jacobsen L, Niggemann B, Dreborg S, Ferdousi HA, Halken S, Host A, et al. Specific immunotherapy has long-term preventive effect of seasonal and perennial asthma: 10-year follow-up on the PAT study. Allergy 2007;62:943-8.

[5] Novembre E, Galli E, Landi F, Caffarelli C, Pifferi M, De Marco E, et al. Coseasonal sublingual immunotherapy reduces the development of asthma in children with allergic rhinoconjunctivitis. J Allergy Clin Immunol 2004;114:851-7.

and should be utilized often and early in companion animal practice. It does not mandate referral although that is certainly an option depending upon your region. However, given the busyness of practice and the limited access to dermatologists; it will be beneficial for the practice and your patients to establish protocols whereby allergen immunotherapy becomes a first line or early intervention in allergic patients.

Allergen specific immunotherapy should be formulated in a patient specific fashion although non-patient specific options are available. Respit® provides regionally specific allergen immunotherapy in a non-test based formulation. The concern is that allergen immunotherapy based upon allergy testing should increase the odds of formulating allergen specific immunotherapy for the patient and having a lower probability of inducing new sensitivities to items that were not reactive for the patient. Serum allergy testing options exist and are feasible for use in practice. The main providers include: VARL® (Veterinary allergy reference laboratory, Idexx®, Heska®, and Nextmune®. There are differences in testing modalities. Prior to 1990, veterinarians who wanted allergy testing performed either referred to a dermatologist for intradermal testing or serum was submitted to a laboratory for RAST/ELISA testing. The RAST/ELISA serum allergy testing employs a solid-phase methodology to identify culprit allergens but with a reputation of unacceptably high incidence of false positive results. In 1990, VARL developed a unique liquid phase matrix technology capable of identifying allergens without false positives. I encourage veterinarians to communicate with serum allergy test providers and determine what they have to offer. It is important to have consistent and reliable results but it is equally important to have technical support. The immunotherapy schedules provided by the labs are simple cookbooks, but every patient is different. The allergic patient no matter the species will likely require modification of the allergen specific immunotherapy dose, concentration, or frequency of administration. The guidance through this process of change should be aided by the allergy test provider as part of the business agreement.

If by the third month of treatment, improvement is not noted, consider calling for technical support. Depending upon the response or lack of response, the recommendation to alter the immunotherapy concentration or frequency of administration may be provided. An average of about 60% of patients may respond to the typical maintenance concentrations but the other 40% would be deemed as a failure without technical support and modifications.

Patient symptoms occur with allergen concentrations greater than the allergic threshold. One must consider that the allergen concentration includes not only the allergen immunotherapy but also the environmental allergens. There are challenges to overcome!

- Clients don't realize or understand that concurrent infections when present must be treated.
- Veterinarians don't realize that they are not alone and that consultations are often included with serum allergy testing and if it is not, change labs.
- Clients and Veterinarians need to understand that allergies wax and wane like the wind blow.
- Relapses may occur and if they occur it could be from newly developed sensitization or environmental concentrations increased.
- Encouraging owners and veterinarians to test early as we can often change the course of the disease.
- Allergen immunotherapy is a money savings over time.
- Recognizing that allergies are a practice builder.

I would like to personally thank Sola Alaba from VARL for sharing his knowledge with me in an effort to support our profession and more pets.

Non-inflammatory Skin Diseases

A photographic review of the more common hereditary skin diseases causing alopecia in dogs and cats. Develop a thorough understanding of the conditions, formulate differential diagnoses, and formulate treatment.

A review of the more common hereditary skin diseases causing alopecia in dogs and cats.

The objective is to become familiar with more common hereditary causes of alopecia in dogs and cats.

- **Alopecic breeds**
  - They are bred to be hairless (Chinese Crested, Inca Hairless, Mexican Hairless, American Hairless terrier, Sphinx cat) and tend to develop mild pyoderma, seborrhea, comedones and milia
- **Congenital hypotrichosis**
  - Developmental noncolor-linked alopecia which is rare in dogs and cats. They may be normal at birth but begin to lose hair at one month of age. Symmetrical hair loss involving various regions (cosmetic problem).

Tardive Hypotrichosis or Alopecia

- Animals are born with normal hair coats. Localized or generalized hair loss occurs as the puppy coat is being replaced or as the animal matures.
- **Color dilution alopecia**
  - Follicular dysplasia of color dilute hairs. Common in dogs bred to be blue or fawn. They appear normal at birth and lose hair between six months and two years. Patients may have secondary pyoderma.
- **Black hair follicular dysplasia**
  - Color-linked follicular dysplasia affecting black hairs. The condition is rare in young tricolored and bicolored dogs.
- **Pattern baldness**
  - Idiopathic alopecic disorder affecting short-coated breeds (pinnae, postauricular region, ventral cervical region, ventrum, caudomedial thighs)
- **Idiopathic bald thigh syndrome of greyhounds**
  - Alopecic disorder resulting in bilaterally symmetrical thinning of the hair on the caudal and lateral thighs.
- **Canine flank alopecia**
  - Seasonally recurring follicular dysplasia. The cause is unknown but it is thought that photoperiod control of melatonin and prolactin secretion may be involved.
  - The highest incidence is in Boxers, bulldogs, Schnauzers, and Airedales
  - Consider melatonin with oral doses of 0.5 mg/kg every 12 hours.
- **Flank Alopecia with interface dermatitis**

- Like flank alopecia seen almost exclusively in boxers.
- They have concurrent annular scaly, crusted lesions beyond changes seen in flank alopecia

- **Preauricular and pinnal alopecias**
  - Preauricular alopecia is a normal finding in cats. This is the sparsely haired areas between the ear and the eye. No treatments or diagnostics are recommended.
  - Pinnal alopecia is uncommon in cats, and it manifests as episodic pinnal hair loss with Siamese cats being predisposed. The condition is nonpruritic and the skin appears otherwise normal. Alopecia may be patchy or diffuse, typically on both pinnae. The skin appears clinically normal. Hair regrowth without treatment and the cause is unknown.
- **Anagen and telogen effluvium/defluxion**
  - Alopecia that develops when hair growth and cycle arrest due to disease or stress.
  - Anagen defluxion hair loss begins within days of the insult.
  - Telogen defluxion hair loss begins one to three months following the insult.
- **Excessive shedding**
  - Frequent owner concern but if alopecia does not develop; it is more of an inconvenience to the owner and of little consequence to the dog
  - Stress and anxiety may increase shedding
- **Traction and compression alopecia**
  - Traction alopecia from rubber bands or barrettes used to hold up the hair.
  - Compression alopecia is often identified in short-coated dogs housed in crates
- **Topical medication reactions**
- **Postclipping alopecia**
  - Failure to regrow hair following clipping.
  - Failure to regrow hair within 3 months is considered abnormal.
  - Assuming no endocrine anomaly hair will typically regrow within 1-2 years.
  - Biopsy is ultimately required (normal and alopecic areas
- **Injection Reactions**
  - Cats may develop dermatitis to various subcutaneous injections. Reactions may include alopecia, inflammation, leukotrichia, pruritus, and ulcerative dermatitis
- **Topical medications**
  - Focal to diffuse alopecia has been seen in both dogs and cats with the application of topical glucocorticoid-containing products. Topically applied parasiticides may cause alopecia with or without inflammation.

Parasites and Dermatology

Parasites affecting patients and potentially their caretakers will be discussed from diagnosis to treatment. Many of the parasites in veterinary medicine can affect the skin of our patients and some are contagious to other patients or pet owners. Improved patient outcomes are afforded with the establishment of guidelines in general practice.

- Parasites are a daily occurrence in the veterinary medicine. So, it's important to be able to collect, identify, and treat them and here's why...
  - Parasites can cause disease states in our companion animals.
  - Parasites can serve as vectors of disease
  - Parasites and pets with parasites can serve as sentinels for human disease
- Fleas (*Ctenocephalides felis felis)*
  - Most common external parasite of companion animals and a year-round pest in the Southeast
  - Flea combing is the diagnostic test of choice.
    - Adult fleas
    - Flea feces will be small, dark, granular debris
    - Eggs are shiny and white, designed to slip through the hair coat and shower the environment.
- Ticks (*Ixodida*)
  - Ticks are not insects, they are arachnids, and can engorge more than 100 times their weight, and lay thousands of eggs. Their lifecycles extend over much greater time periods as compared to fleas.
  - Many different species exist and identification is an important factor when considering disease states due to tick exposure.
    - *Rhipicephalus, Dermacentor, Ixodes, Amblyomma*
      - *Haemaphysalis longicornis (Asian Longhorned tick)*
  - Collection is as easy as finding them and removing them but care should be taken when removing attached ticks. Video available at www.tickencounter.org
    - Grasp close to the skin and pull without twisting
    - Don't use solvents
    - Don't crush the tick body
  - Examine under low power to identify the species. The website at www.tickencounter.org has a tick identification chart that you may find useful.
- Mites (*Acari*)
    - *Demodex* mites are a microscopic species that live primarily in hair follicles.

- Specimen collection can be done two ways
  - Scraping with a spatula or scalpel blade, scrape the skin in the direction of the hair growth. Squeeze the skin to extrude material from the hair follicle. Place the material on a slide with mineral oil.
  - Hair plucks are especially useful in areas where scraping may be difficult like the paws or face. Hair is epilated and placed on a slide with mineral oil. Examine around the base of the hairs.
  - Fecal examination: Mites can often be found in fecal preparations as they are often swallowed when the pet grooms.
- Identification under 4x or 10x objective using lower light and lower placement of the condenser and a smaller iris aperture to increase contrast
- Adults, nymphs, larvae, and eggs are identifiable.

➢ *Sarcoptes* mites are a superficial burrowing mite
- Specimen collection requires superficial scraping covering large surface areas but likelihood of finding mites is low. Samples collected are placed on a slide and evaluated as described for *Demodex spp.*

➢ *Cheyletiella* is a mobile surface mite often referred to as “walking dandruff”.
- Collection by superficial scrape, hair pluck, flea combing, or acetate tape placed on the hair coat and then on a slide. View under a microscope as above.

➢ *Notoedres* is another burrowing mite.
- Collected by skin scrapings, epilating crusts, and viewed under a microscope
- Fecal examination may also yield mites
- Distinguished from *Sarcoptes* by smaller size, lack of dorsal spines, and dorsal anal opening

➢ *Otodectes* is a surface mite of dogs and cats that usually inhabits ear canals but can live outside of the ear canal on the skin.
- Ear debris is collected with cotton-tipped applicators and placed on a slide with mineral oil and viewed as above.

➢ Trombiculid (Chiggers) larvae are the only parasitic form of *Trombicula*.
- Organisms may be visible with the naked eye, collected by superficial scraping, and viewed under a microscope.

❖ Lice (*Phthiraptera*)

➢ Larger than mites, these wingless, dorsoventrally flattened insects can be seen with the naked eye.

- Lice are collected with hemostats or forceps and placed on a slide for microscopic exam.
- Identification is made easier by the fact that most lice are highly species-specific but head morphology and location on the host is also telling.

- Flies and Mosquitoes (*Diptera*)
  - Flies can cause bacterial, viral, protozoal, and helminthic diseases but effects on the skin are usually related to bites and myiasis.
  - Black Flies, *Culicoides* (No-See-Ums), Deer Flies, Horseflies, Sand flies, and Stable flies, Tsetse flies are some of the parasitic flies that can cause various infections.
    - Some infections may be diagnosed by blood smear
  - American Screwworm flies (Cochliomyia), Blow flies (*Lucilia*), and Bot flies (*Cuterebra*) can all cause myiasis.
  - Mosquitoes can transmit heartworms (*Dirofilaria immitis*).
    - Diagnosed through antigen or antibody screening (SNAP)
- Intestinal parasites
  - Intestinal parasites are diagnosed by fecal examination.
    - Hookworms
    - Whipworms
    - Roundworms
    - Tapeworms
- Review
  - Parasite collection and identification are important in our every day practice.
    - Prevent bacterial, viral, protozoal, and helminthic infections of our companion animals
    - Reduce the likelihood of companion animals becoming reservoirs of infection
    - Raise awareness for the risk of human exposure
  - Be knowledgeable about treatment options and make direct recommendations.
    - The odds of a client leaving with a product decreases significantly when you offer them a multitude of products versus the one that is best suited for the pet.
  - CAPC, Companion animal parasite counsel, www.capcvet.org is an excellent reference for the practice with regards to prevalence maps and treatment guidelines.

Dermatophytosis Clinical Update

Dermatophytosis is a common disease and demands an understanding of diagnosis and management. The clinical consensus guidelines of the World Association for Veterinary Dermatology will be summarized and reviewed from a clinician's vantagepoint with particular attention on diagnostic tests, disease treatment, and monitoring.

Dermatophytosis is a superficial fungal skin disease. It is an important skin disease as it is infectious and zoonotic.

- The most common agents in dogs and cats are *Microspourm canis, Microsporum gypseum* and *Trichophyton mentagrophytes*. Consensus recommendations for veterinary clinicians related to diagnosis and treatment will be reviewed.
- Cutaneous fungal infections are broadly divided into two groups:
    - those limited to the stratum corneum, hair, and claws
    - those involving the dermis and subcutaneous tissues. Superficial fungal infections of the skin are often due to dermatophytes and *Malassezia* spp.
- Subcutaneous mycoses often result from implantation and deep mycoses of the skin represent hematogenous spread or extension from underlying structures.
- In the immunocompromised host, opportunistic fungi can lead to cutaneous and systemic infections.

Dermatophytes have the unique ability to invade and multiply within keratinized tissue. In human medicine, naming clinical infections due to dermatophytes, "tinea" precedes the Latin name for the body site.

The first stage of infection involves contact with and adherence of the infectious elements, arthroconidia, to the skin. Dermatophytes produce keratinases which allow invasion into the stratum corneum. Mannans in the cell walls of dermatophytes have immune-inhibitory effects. Mannins may also decrease epidermal proliferation, reducing the likelihood of fungus being sloughed prior to invasion. If invasion is successful, disease occurs.

- Disease overview
  Superficial fungal infection of keratinized skin by zoophilic, geophilic or anthropophilic fungal organisms. In most, dermatophytosis is a self-limiting skin disease lasting weeks to months. Treatment with the goal of shortening disease course and preventing transmission to others.
  - Pathogens of importance
    There are more than 30 species of dermatophytic fungi. Zoophilic dermatophytes are adapted to living on animals. Geophilic dermatophyte species are associated primarily with decomposition of keratin of hair, feathers and horns present in the soil. Some of the organisms can infect animals and humans after contact with contaminated soil. The traditional name of Trichophyton mentagrophytes encompasses several different zoophilic and anthropophilic species that have clearly discriminated based on host preferences and on morphological, sexual, and molecular characteristics. Now, *T. mentagrophytes* (*T. mentagrophytes* complex) and *M. gypseum* (*M. gypseum* complex) are known to be complexes of separate teleomorph species.
  - Prevalence and risk factors

Dermatophytes are isolated more commonly for symptomatic versus asymptomatic animals and in those housed in groups or free-roaming cats. Warm locations trend towards increased prevalence. Dermatophytes are not considered part of the normal fungal microbiota of dogs and cats. Although not well documented there are thoughts that dermatophytosis and concurrent demodicosis may be more common than realized. Breed predilections may include Persian cats and Yorkshire terriers (subcutaneous dermatophytic infections reported most commonly). Hunting and working breeds may be at greater risk of *M. gypseum* and *M. persicolor* due to increased contact with contaminated soil. Seropositive FIV and/or FeLV status in cats does not increase the risk of dermatophytosis.

- Pathogenesis of infection/immune response

  The infective form of dermatophytes is the arthrospore. Transmission by direct contact between an infected and uninfected animal or by fomite transmission. Concurrent microtrauma to the skin is an important factor. Transmission from a contaminated environment is not considered an efficient means of transmission. Trichophyton infections are likely due to contact with infected rodents or their nests.
  - The described three stages of development of a dermatophyte infection include:
    - The first stage: adherence of arthroconidia to corneocytes
    - The second stage: fungal conidial germination; where germ tubes emerge from arthroconidia and penetrate the stratum corneum
    - The third stage: involves dermatophyte invasion of keratinized structures
  - Dermatophytes can counter the host immune responses by lymphocyte inhibition by cell wall manans, macrophage alteration and altered keratinocyte turnover.
  - Antibody and cell-mediated immune responses occur in dermatophyte infected animals.
  - Clinical cure and protection against reinfection is dependent on a strong cell-mediated immune response
- Clinical signs
  - Clinical signs reflect pathogenesis of the disease. There can be a combination of hair loss, papules scales, crusts, erythema, follicular casts, hyperpigmentation, and changes in nail growth and appearance. Lesions are typically asymmetrical with variable pruritus. Lesions occur most commonly on the face, ears, and muzzle. Then, progress to involve the paws and other regions of the body.
  - Nail/claw involvement characterized by onychogryphosis on one or more digits may occur.
  - Pustular dermatophytosis is rare but can mimic the histopathologic appearance of pemphigus.
  - Dermatophytosis is a differential diagnosis for any cat with pododermatitis or widespread exfoliative dermatitis.
  - Nodular dermatophytic lesions
    - Dogs and cats can develop nodular dermatophyte infections.
      - Diagnosis via biopsy or cytological evaluation of aspirates.
      - Kerion, pseudomycetoma and mycetoma reaction patterns occur.
      - Kerion: Wood's lamp examination is frequently negative; cytology is diagnostic in many cases and tissue culture frequently identifies *M. canis* but hair sample cultures typically do not identify the pathogen.

- Patients with mycetoma or pseudomycetoma, surgical excision with systemic antifungal therapy is recommended. The prognosis is guarded in many cases.

- Diagnostic testing

  The question is NOT "What is the gold standard?" The question is: What test confirms an active infection and what test confirms the absence of active infection?

  - Wood's lamp and fluorescence
    - Wood's lamp is NOT the same as a black light which emits a large amount of visible light making visualization of fluorescence difficult.
    - The primary dermatophyte of veterinary importance that produces fluorescence is *M. canis*.
      - The fluorescence is due to a chemical metabolite, **pteridine**, located in the cortex or medulla of infected hair.
      - Fluorescence is usually detected by 10-14 days post-infection but as early as 5-7 days post-infection.
      - As hairs grow out, pteridine in treated patients' hair will continue to fluoresce even after successful treatment and fungal culture negative status.
  - Direct examination of hair and/or scale
    - Microscopic examination of hair and scale is a technique used to confirm the presence of dermatophyte infection
    - Microscopic exam with hairs and scale mounted in mineral oil is preferred and although KOH and chlorphenolac preparations have been described; there are more disadvantages than advantages to these.
  - Fungal culture
    - The fungal culture has long been stated as the "gold standard" of diagnosis.
    - The culture detects the presence of absence of fungal spores on the hair coat or hair sample.
    - False positive and false negative results occur, and negative cultures are less definitive than positive cultures.
    - Overgrowth of non-pathogenic organisms can result in false negatives; poor or inadequate sample collection may also provide false negative results.
  - PCR
    - False negative and false positive results are possible. Sample collection is important. Nonviable DNA on the hair coat will still test positive. Positive results can represent fomite carriage, nonviable fungal organisms, or active infection.
  - Biopsy
    - Nonhealing wounds or nodules caused by dermatophytes
    - Unusual lesions not easily attributed to other causes

- Topical antifungal treatments

  Topical treatment goals are to decrease the infectious, contagious, and zoonotic risks by disinfecting the hair coat and minimizing environmental contamination. Twice weekly lime sulfur, miconazole/chlorhexidine shampoo or other antifungal shampoos minimize shedding and spread of infectious material in the environment.
    - Lime sulfur must be diluted properly.

- Systemic treatment

- Itraconazole (noncompounded) and terbinafine are the most effective and safe treatments for dermatophytosis
  - It requires specific formulations to be absorbed in the GI tract. It accumulates in adipose tissue and sebaceous glands. It should be administered with food. The trade drug or the generic should be administered as absorption of compounded itraconazole in dogs was as less than 6%! Elevated liver enzymes are not uncommon.
  - Terbinafine has the lowest MIC for *Microsporum spp.* and *Trichophyton spp.* as compared to itraconazole, fluconazole, ketoconazole, and griseofulvin.
- Ketoconazole and Fluconazole are less effective treatments

❖ Environmental disinfection

The primary goal is to shorten the course of treatment.

- Fungal spores in the environment

  The infective component is called an arthroconidium; shed/fragmented hairs are a source of contamination. Dermatophytes do "NOT" invade the home as is the case with black mold.
- Antifungal disinfectants

  Disinfection of nonporous surfaces

  Mechanical removal of all debris

  Washing with a detergent followed by rinsing

  Follow with disinfectant although likely not required

  Disinfection of laundry

  Washable textiles could be decontaminated with mechanical washing at any temperature and the addition of bleach was not helpful.

  Disinfection of carpets

  Vacuum to remove gross debris

  Wash twice with a carpet shampooer with detergent or by hot water extraction.
- Strategies to minimize shedding and spread of infective material; arthrospores are shed into the environment from the hair coat.
  - Clipping the hair coat
    - Clipping the entire coat is stressful and increases risk for microtrauma to the skin. In multi-cat households it may lead to increase disease spread.
  - Topical therapy
    - Topical therapy with twice a week shampooing using chlorhexidine/miconazole prevented contamination of the home.
  - Confinement to an easily cleaned area
    - Socialization should begin at three to five weeks of age kittens and puppies.
    - Confinement is an important part of containment. Kittens and immunosuppressed cats may be at increased risk.
      - Items in the area should be limited to those that can be washed daily.
  - Frequency of cleaning
    - Twice weekly cleaning/disinfection is recommended.
    - Daily removal of hair from the room/area where the pet is being confined.
    - Daily one step cleaner on the days between more thorough cleaning.

❖ Zoonotic considerations

- People at extremes of age (<5 years of age; ≥65 year of age) are at increased risk as well as those who are pregnant or immunocompromised. The disease is primarily transmitted from contact with the hair coat or skin lesions of infected animals.

❖ Conclusions drawn in the clinical consensus guidelines of the World Association for Veterinary Dermatology include

- No one diagnostic test was identified as the gold standard
- Treatment requires systemic and topical therapies
- Wood's lamp and direct examinations have good positive and negative predictability
- Systemic antifungal drugs have a wide safety margin (itraconazole and terbinafine)
- Physical cleaning is most important for decontamination of the exposed environments
- Serious complications of animal-human transmission are rare

Feline Otitis, Cats are not Small Dogs

Feline ear disease is not the same as we know in dogs. There are conditions that are exclusive to cats; even otitis externa is seldom as straightforward in cats. We will focus specifically on cats and give them the attention they deserve. Cone beam CT, video otoscopy, and clinical photos will be utilized to demonstrate the marked variation in presentations.

Discussion

- As a rule, cats are not small dogs and feline ear disease is no exception. We frequently encounter allergic dogs that have otitis externa, but do we see otitis externa and secondary infections with the same frequency in our allergic feline patients? It is far more likely that we cause or at least contribute to otitis externa when it does occur in cats. Cats do not have the same level of susceptibility to secondary infections as dogs. However, otitis externa does exist in cats as a multifactorial problem as described in dogs. There are predisposing factors (conformation, environmental, treatments/cleaning), perpetuating factors (yeast, bacteria), aggravating factors (erosion, ulceration, otitis media, tumors, polyps, sebaceous hyperplasia, lichenification), and primary factors (ectoparasites, allergic skin disease, autoimmune diseases, foreign bodies, tumors, polyps). Primary factors induce otitis externa directly, the most common of which being foreign bodies and ectoparasites. Autoimmune diseases, neoplasia, and fungal infections also serve as primary causes of otitis externa. Perpetuating factors, such as bacteria and yeast, are common place for dogs but less frequent problems in cats. Allergic or irritant reactions occur frequently with the application of topical medications and are often unrecognized. A common predisposing factor for otitis externa in cats and dogs is the regular use of cotton-tipped applicators for the removal of normal cerumen.
    a. A good example of this is the mature Siamese or Persian cat with excessively ceruminous ears noted on physical examination but considered asymptomatic. If left alone, the asymptomatic cat will often remain asymptomatic, if cleaned, the trauma of cleaning will often result in the development of clinical signs. Consider a little benign neglect for these patients and explain to the owners why we take a minimalist approach to these cases. However, if symptomatic and infection is identified, treatment is warranted.
- Differential diagnoses can be limited based on the observation of unilateral versus bilateral problems. Unilateral conditions increase the likelihood of a foreign body, polyp,

neoplasia, or trauma. Bilateral problems are more often associated with parasitic, metabolic, allergic or immune mediated causes.

- A common predisposing factor for cats and some dogs is the use of cotton-tipped applicators in the canals. Cotton is abrasive and causes damage to the sensitive aural canals. The normal anatomy of the ear canal allows a cotton-tipped applicator to serve as a battering ram. Cerumen impaction is common, especially in cases where cotton-tipped applicators are frequently utilized. Frequently, our efforts to provide a service by removing ceruminous debris from the aural canals of cats results the creation of a problem where one did not previously exist.

Diagnostic Procedures

- A properly performed diagnostic evaluation will provide the information needed to determine a treatment plan. Patients presenting for disorders affecting the ears should have basic samples collected following a gross visual examination of the ear. These basic samples include swabs for cytology, smear, and culture. This avoids the expletives that follow a cleaning that occurred prior to sample collection. An otoscopic evaluation is then performed. If it is determined that exudate, cerumen, or foreign material is precluding full evaluation of the canals, anesthesia should be performed. Once intubated, the canals should be flushed with appropriate lavage solutions until the canals are free of debris. Typically we use warm saline, Tris-EDTA containing solution, or ceruminolytic agents (Dechra KlearOtic®, Douxo Micellar Solution®, or Vétoquinol Cerumene®) as our initial lavage fluids. By in far though warm physiologic saline is best for cats especially if there is a ruptured tympanic membrane! Once the canals are free of debris, one can determine whether anatomic anomalies, mass lesions, ruptured or bulging tympani exist. If masses are detected needle aspirates and biopsies should be performed. If available, a CT scan can be invaluable in determining the extent of the problem when polyps or neoplasia are identified.

Treatment Options

- It is thought that cats are more susceptible to ototoxicity than dogs. As discussed previously, general anesthesia should be considered even for very minor ear cleaning. Iodine, aminoglycoside antibiotics, and chlorhexidine should be avoided.
- Topical therapy is often the mainstay in canine otitis externa treatment whereas in the feline patient, I feel that topical medicaments should generally be avoided.

- Although it is unclear why, feline patients tend to have an increased rate of irritant and allergic contact reactions in the ear pinnae and canals compared to dogs.

A Few Diseases and Thoughts

- Chronic low-grade inflammation can eventually result in changes that predispose to the development of neoplasia. This is typified in the cat with chronic or recurrent otoacariasis caused by *Otodectes cynotis* which goes on to develop ceruminous gland adenocarcinomas in the future.
- **Idiopathic ceruminous otitis externa** occurs in some feline patients and is heralded by increased cerumen production where brownish colored debris is seen in the canals. Although visually objectionable, more conservative treatment is recommended even if secondary infection is identified. Otherwise, more aggressive treatment and cleaning may result in the development of chronic clinical signs. Allergic skin disease may play a role in the etiology of this condition. Systemic or topical glucocorticoids may be of benefit to relieve pruritus if noted.
- **Aural polyps** are most commonly identified in younger cats. The cause of polyp formation remains unknown. The clinical signs vary from pruritus, head shaking, Horner syndrome, to respiratory signs. Secondary infections may be present when polyps exist and typically they cause unilateral disease. Exudate often obscures visualization of polyps in the aural canal. A thorough but gentle ear flush should be performed with warm sterile saline to clear the canal of exudates and prepare for otoscopic evaluation. Although not required, a video otoscope provides improved visualization. When evaluating for polyps, it is important to retract the soft-palate and evaluate the nasopharynx for protrusion of a polyp from the eustachian tube. This process requires the patient to be under adequate anesthesia. A flexible endoscope can be retroflexed and positioned dorsal to the soft palate or a dental mirror can be utilized in the absence of a flexible scope. Computed tomography scans are beneficial but sometimes less than readily available. When polyps are removed residual tissue can result in recurrence.
- **Feline ceruminous cystomatosis** is an uncommon, non-neoplastic disorder of cats. Multiple pigmented nodules or vesicles within the external ear canal and on the concave pinnae are characteristic. Etiology is unknown but congenital and degenerative causation are considered as well as being a sequela to otitis externa. Abyssinian and Persian breeds may be over-represented. Histopathologically, it is characterized by cystic ceruminous glands often grouped in clusters and typically contain inspissated

secretory product. Alterations in the ear canal anatomy leads to a failure in the self-cleaning mechanisms of the ear canal predisposing to secondary infections. Although diagnosis is typically straightforward, the pigmented masses may be clinically mistaken for melanotic or vascular neoplasms. Laser or surgical ablation should be considered and is often helpful although new lesions are likely to occur.

- **Apocrine cystadenoma** is an uncommon neoplastic condition of dogs and rare in cats. Tumors are typically less than 1cm. The overlying skin is typically atrophic, alopecic, and often appear blue or purple. The contents are usually clear, although secretory product of larger inspissated masses may be brown and gelatinous. Ulceration is uncommon. Typically found on the head when present except in Persians and Himalayans which may present with masses in other anatomic sites like the pinnae. The condition may be hereditary in these breeds.
- **Proliferative necrotizing otitis of kittens** is a rare but highly characteristic syndrome. Typically, these patients are a year of age or less with acute development of erythematous plaques with adherent, keratinaceous debris affecting the concave or medial aspect of the pinnae. These lesions progress to erosions and ulcerations. Most seem indifferent to the lesions although pruritus and discomfort may be noted with ulceration. Most cases have been reported to experience spontaneous resolution between 12-24 months of age. The etiology is unknown and biopsy confirmation is required. Keratinocyte apoptosis induced by epidermal $CD3^+$ T cells has been implicated in the pathogenesis. Although it remains unclear at this time, topical tacrolimus may be effective in the treatment of this condition. Since the condition has a history of spontaneous resolution, it is difficult to ascertain if treatment with tacrolimus or spontaneous regression was responsible for clinical resolution.

What if it is Not Allergic?

Pruritus and allergic skin disease go hand in hand but when pruritus is present, and allergies are not; what is next for your patient? A review of nonallergic pruritic skin diseases. How to distinguish between allergic and non-allergic skin diseases will be reviewed. The goal is to review the differentiation process for some of the non-allergic conditions encountered in practice.

- Allergic responses are frank examples of the detrimental side of the immune system. The allergic response involves hypersensitivity reactions directed at allergens. In basic terms, the immune system has the capacity to determine *self* from *non-self* molecules. This characteristic exists in a delicate balance and once disrupted, autoimmunity and allergy may occur. There are lots of conditions that can mimic allergies.

Hypersensitivity Disorders

- **Urticaria and Angioedema:** cutaneous hypersensitivity reaction to immunologic and non-immunologic stimuli.
    - Multiple factors have been reported as linked to angioedema and urticaria development. Drugs, vaccines, food, stinging or biting insects and plants (nettle, buttercup)
    - Variable pruritus
        - Differential diagnoses should include juvenile cellulitis, infectious cellulitis, mast cell tumor, and cutaneous lymphoma. In warmer regions, spider and snake bites should also be included.
    - Treatment considerations should include the use of epinephrine subcutaneously or intramuscularly and glucocorticoids.
        - Antihistamines are tertiary and should be considered in chronic cases.
- **Atopy:** An individual with atopy is sensitized to environmental allergens and exposure results in production specific IgE antibodies. Atopic dermatitis, rhinoconjunctivitis, and asthma are considered atopic diseases.
- **Atopic Dermatitis:**
    - **Canine atopic dermatitis** is defined as “A genetically predisposed inflammatory and pruritic allergic skin disease with characteristic clinical features. It is most commonly associated with IgE antibodies to environmental allergens.” per American College of Veterinary Dermatology Task Force on canine AD.
        - ~80% of atopic dermatitis patients have IgE for house dust mite, grass, and other omnipresent allergens.

- Food should be discussed as food allergens or triggers for atopic dermatitis versus a separate entity or disease.
- No one test, exam finding, or historical findings are unique to atopy.
- Clinical course of disease varies. The typical age of onset is between 6 months and 3 years of age. Patients in warm climates with high pollen prevalence throughout the year are at increased risk of early onset of clinical signs. Many begin with seasonal signs which progress to continuous, but some may begin with nonseasonal signs due to their allergens being nonseasonal in nature. Patients who relocate to a different geographic region may develop atopic dermatitis often within 1-3 years of the move.

- **Basic clinical workup for Atopy**
  - Cytology, deep and superficial scrapings, as well as a fungal culture
  - No form of allergy testing should be utilized as a screening test.
  - Some criteria for canine atopic dermatitis (mixture from different studies)
    - Onset of signs under 3 years of age
    - Dog living mostly indoors
    - Pruritus without lesions at onset (Itch that rashes)
    - Affected front paws
    - Affected ear pinnae
    - Unaffected ear margins
    - Unaffected dorsolumbar area
    - Cheilitis (inflammation of the lip)
- **Feline**
  - **Feline Atopic Dermatitis:** The incidence is unknown but some feel that it is second only to flea allergy. The role of food allergen as a trigger for atopic dermatitis flares has not been evaluated.
    - Most develop clinical signs between 6 and 24 months of age.
    - Pruritus is the most consistent clinical finding along with associated alopecia.
    - Feline patients with atopic dermatitis may develop lesions which are ultimately classified as part of the eosinophilic granuloma complex.
    - *Malassezia* spp. may, as in dogs, contribute to pruritus and lesion development in the feline patient.

- As is the case with our canine patients, there is no perfect diagnostic test and diagnosis relies upon a combination of history, physical examination findings, and exclusion of other causes of pruritus. If cats read the dog book, they did not pay attention to the rules when it comes to clinical findings.

- **Atopic-like dermatitis** is the term used to describe patients with clinical signs consistent with atopic dermatitis and no detectable IgE. "An inflammatory and pruritic skin disease with clinical features identical to those seen in canine atopic dermatitis in which an IgE response to environmental or other allergens cannot be documented."

Immune-Mediated Skin Diseases

- **Pemphigus foliaceus** is an autoimmune condition that is frequently mistaken for allergic dermatitis and its sequela. Symptoms include scaling, crusting, pustules, papules, and erosions. So, how do we distinguish?
  - History will shed some light: Lesion development is usually in a wave rather than variability in the rate of development or progression of lesions.
  - Cytology of lesions may reveal acantholytic keratinocytes.
  - Biopsy
- **Cutaneous adverse drug reaction**, also called drug eruption, is an unintended effect due to the use of a medication. The dermatologic signs can mimic almost any dermatologic condition.

Vascular Diseases

- **Familial canine dermatomyositis** is a heritable inflammatory, ischemic disease of skin within identified "at risk" breeds that is of unknown etiology. Key features include alopecia, scaling, crusting, and pigment changes. Collies and Shelties are over-represented for this juvenile-onset disease. How do we distinguish it from allergic dermatitis?
  - Breed or familial history.
  - Lesion location can be a factor as skin over bony prominences and on distal extremities is more at risk.
  - Biopsy

Endocrine and Metabolic Diseases

- Necrolytic migratory erythema is due to underlying hepatic disease causing progressive necrolytic changes in the skin due to nutritional deprivation. Paw pads and mucocutaneous

junctions tend to be the most affected with alopecia, erosions, ulcerations, and crusting but other areas can also be affected. Lesions are typically bilaterally symmetrical.

- No previous history of skin disease, signs of systemic disease, blood work (liver values), ultrasonography, serum amino acid levels (UC Davis), skin biopsy

Parasitic

- **Demodicosis** can easily look like secondary infection due to underlying allergies and there may, in fact, be secondary infections present. Demodex mites are typically found in hair follicles and can overpopulate secondary to other factors like endoparasitism, poor nutrition, stress, genetics, and immunosuppression. Symptoms include erythema, alopecia, hyperpigmentation, scaling, crusting, lichenification, and pustules.
    - Skin scrapes and hair plucks done properly should yield various life stages of mites and eggs depending on the severity of infection. Biopsy is sometimes required (Shar pei). Coproscopic exam may reveal Demodex mites ingested during fastidious grooming.
- **Sarcopitic acariasis** is often an extremely pruritic skin disease that can mimic allergic skin disease and secondary infections so how do we differentiate?
    - History of new pets or exposure to affected animals; improvement with empiric treatment even if multiple skin scrapings are negative!

Neoplastic

- **Epitheliotropic lymphoma** is a neoplastic condition that can mimic many dermatologic conditions including sarcoptic acariasis, allergic dermatitis, food adverse reaction, keratinization disorders, and vasculitis. It cannot be distinguished from allergic disease on appearance alone.
    - No previous history of skin disease, erythema, scale, pruritus.
    - There may be lymph node involvement as well systemic signs.
    - Cytology and biopsy
- **Paraneoplastic alopecia** has a characteristic appearance and can be confused with allergy. Cats with the condition can groom excessively and present with worsening alopecia that usually begins on the ventrum and progresses to the limbs and face. The skin is often shiny, smooth, and inelastic with or without paw pad involvement. Pruritus is variable and may correlate with secondary malasseziasis. How do we differentiate allergic disease from an underlying pancreatic neoplasm or bile duct carcinoma responsible for dermatologic manifestations of systemic disease?

- No previous history of skin problems, concurrent systemic disease is usually present including: vomiting, diarrhea, lethargy, weight loss, and inappetence.
- Biopsy, radiography, ultrasonography, exploratory laparoscopy

- **Thymoma-associated exfoliative dermatitis** can present exactly like an allergic cat with secondary infections. Symptoms include erythema, alopecia, and crusting that increase in severity gradually, often starting on the head, neck, and pinnae. Pruritus is variable and usually associated with the secondary infections. So, how do we differentiate this condition from allergic disease?
  - No previous history of skin problems, systemic signs may be present.
  - Dermatologic symptoms usually precede any systemic signs of illness but there may be coughing and dyspnea, as well as anorexia and lethargy in advanced cases.
  - Biopsy, radiographs, ultrasonography

❖

❖ **Bowen's disease (Multifocal squamous cell carcinoma in situ)**
- Multifocal superficial neoplasms of keratinocytes.
- Unlike Squamous cell carcinoma in cats, these lesions can occur in pigmented skin or in skin unexposed to ultraviolet light.
- In cats, the lesions are likely associated with papillomavirus.
- Progression to squamous cell carcinoma may occur.
- Treatment includes surgical excision, CO_2 laser ablation, cryosurgical ablation, imiquimod, and strontium-90 plesiotherapy in smaller lesions.
- Prognosis for cure is guarded due to the likely development of new lesions.

❖ **Canine solar dermatosis**
- Actinic damage that affects the less haired poorly pigmented areas of the body. Actinic keratoses and squamous cell carcinoma can develop with repetitive exposure to ultraviolet light.
- Patients are more commonly outdoor dogs and most are avid sunbathers.
- White short coated breeds such as Beagles, Dalmatians, Bull terriers, Boxers, etc. are more likely to develop this condition.
- Truncal and nasal lesions are most common.
  - Lesions begin with erythema and scale and may progress to papules, plaques, and nodules ultimately becoming ulcerated and eroded in many cases.
  - Secondary bacterial pyoderma is common

- Treatment involves further restriction of sunlight exposure and utilization of appropriate sun block or sun screen when avoidance is not possible.
  - Without the lifestyle changes to reduce sunlight exposure and further damage, it is more likely that squamous cell carcinoma, hemangioma, hemangiosarcoma may be seen.

❖ **Cutaneous drug reaction**

- Cutaneous or mucocutaneous reaction to topical, injectable, or oral drugs. Although it is uncommon, a drug reaction can occur after a single treatment or after years of treatment.
- Clinical signs may vary from papules, pustules, vesicles, purpura, bullae, erosions, ulcerations, otitis externa, and erythema multiforme.
- Fever, depression, or lameness may be present.

❖ **Cutaneous Vasculitis**

- An inflammatory disease affecting the blood vessels which is usually secondary to immune complex deposition within the vessel walls.
  - Changes may be seen with bacterial, viral, rickettsial or fungal infections, malignancy, food hypersensitivity, drug reaction, and vaccine associated vasculitis among others.
- Clinical findings may include purpura, necrosis, and punctate ulcers typically involving the pinnae, paw pads, tail, and scrotum.
- Treatment involves attempts to identify any underlying cause.
  - Treat secondary pyoderma while gaining control over the autoimmune mediated disease.
  - Treatment may be discontinued after 4-6 months in some patients but others require long-term maintenance therapy.

❖ **Erythema multiforme**

- The pathogenesis is unknown but it may represent a host-specific cell-mediated hypersensitivity reaction induced by various antigens that alter keratinocytes.
- Lesions often develop along the dorsum and occur acutely with multifocal to diffuse distribution.
- Lesions may appear as erythematous macules, raised papules and plaques possibly forming “target” lesions.
- Treatment is initiated by discontinuance of all medication initiated within 2-4 weeks prior to lesion development.

- **Opportunistic mycobacteriosis**
  - A deep skin infection with saprophytic mycobacteria normally found in the soil or water are inoculated into the skin via a wound.
  - Chronic nonhealing subcutaneous nodules, abscesses and cellulitis with fistulous tracts.
  - Lesions may occur anywhere but the ventral abdominal fat pad is commonly affected.
- **Pemphigus foliaceus**
  - An autoimmune skin disease
  - Probably the most common autoimmune skin disease in dogs and cats.
  - Typically idiopathic but it can be drug induced or a sequela to a chronic inflammatory skin disease.
  - Although pustules are the primary lesions, they are often difficult of find.
  - Lesions on the pinnae paw pads, and nasal planum are unique and characteristic of autoimmune skin disease.
- **Sebaceous adenitis**
  - A destructive inflammatory disease of the sebaceous glands
  - Most common in young to middle-aged Akitas, Samoyeds, Standard Poodles, and vizslas.
  - Scaling most commonly involves the dorsum, face, ears, and tail.
  - Pruritus is not usually seen unless secondary bacterial or *Malassezia* infection is present.
- **Epitheliotropic lymphoma**
  - Malignant neoplasm that arises from T lymphocytes.
  - Canine cutaneous lesions may include generalized erythema, scale, pruritus, single to multiple plaques or nodules, mucocutaneous hypopigmentation and ulcerations.
  - Feline cutaneous lesions include exfoliative erythroderma with alopecia and crusting. Plaques and nodules are common on the head and neck.
  - Prognosis is poor regardless of treatment with most animals surviving less than six months following diagnosis.

Top 10 Derm Mistakes

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What have I seen after 20 years of referrals? I will review what I feel are the "TOP 10" mistakes made in general practice with particular attention to dermatology, parasitology, in-house diagnostics, as well as client communication. How do you benefit from the mistakes of myself and others?

Missteps and Mishaps are part of being human. We will discuss common oversights, errors, omissions, and problems that occur in dermatology cases and how to minimize them.
Whether it relates to an otoscopic exam or a dermatology exam or even dermatology history; there are a multitude of opportunities for mistakes to occur.

- Skin scrapings and how to adjust your scrape based upon clinical suspicion.
  - Scraping techniques should be modified based upon clinical impression and body sites.
  - Different options beyond the "10" blade.
- Bathing the correct way; yes, there is an incorrect way too.
  - Early client education and its importance
- How to utilize cytology and culture results to maximize outcomes.
- Culture and sensitivity, why the numbers and letters may not matter in all cases.
- Otoscopic examination restraint techniques and what is the common cause of discomfort during the exam and how to avoid it.
- The difference between generic and compounded medications.
- Local anesthesia use and how general anesthesia may be avoided in certain cases
- Presumptive diagnosis without confirmation
- Ischemic dermatitis overlooked and perpetuated
- Unilateral otitis externa
- How to maximize the information gathered from the dermatologic examination
- Patient history
  - Ask open-ended questions!
  - Medication and vaccination history
  - Parasite control measures
- The challenges of dealing with the time-sucking, morale busting, money-losing nightmare client.
  - It is okay to terminate a relationship.
    - The client that takes more of your time than they are worth.
    - The client that overrides your recommendations.
    - The client that demonstrates a lack of respect.
    - The client that demonstrates a lack of communication.
    - The client with whom the relationship is not improving.
    - The client that you can't stand working with.
    - The cost-focused client if you are always forced to practice below your comfort level.
    - The client that ignores your advice.
- The burden of responsibility in veterinary medicine. Many of us did not learn much if anything about the burden of responsibility that is thrust upon us in veterinary medicine. That is until we left the walls of our institutions of higher learning.

Is This Pyoderma, or is it an Immune-mediated Disease?

It is a frequent occurrence that a skin condition is assumed to be a pyoderma and frequently this is true. However, immune-mediated skin disease can mimic pyoderma. We will discuss the differential diagnoses for pyoderma and how to make the diagnosis and formulate treatment for the more common immune-mediated skin diseases.

Bacterial pyoderma is a pyogenic bacterial infection of the skin. Although it is quite commonly seen in practice, the clinical appearance can vary markedly. This variability in clinical appearance can be source of confusion and frustration. Bacteria colonize the skin of humans and animals. The most common etiologic agent in dogs is *Staphylococcus pseudintermedius.* This organism can frequently be isolated from nasal, oral, and perianal sites which likely serve as the reservoir for skin colonization. Inoculation of the skin can occur from self-trauma such as licking and chewing in addition to grooming. There are anatomic and physiologic factors which contribute to the increased rate of bacterial pyoderma in dogs versus humans. Humans have a follicular plug which is lacking in the canine. Abnormal intercellular lipids and a higher pH may also contribute to pyoderma.

Although pyoderma is often easily recognized there are clinical presentations which can be rather confusing even for the seasoned clinician. Differentiating between the myriad of presentations that represent pyoderma and other disease can also be challenging.

The conditions which can be easily mistaken for pyoderma include diseases such as juvenile cellulitis, pemphigus complex diseases, drug reactions, eosinophilic folliculitis and furunculosis. Manifestations of pyoderma include post-grooming furunculosis, acral lick dermatitis, mucocutaneous pyoderma, exfoliative superficial pyoderma, bullous impetigo, and nasal folliculitis and furunculosis.

Juvenile cellulitis or puppy strangles is distinctive clinically and affects dogs between 3 weeks and 4 months of age. Initially, acute facial swelling develops followed by papules and pustules which progress to draining tracts and crusts. This disease process responds to corticosteroids. Clinically, when clinicians are faced with their first case of juvenile cellulitis it is often confused with deep pyoderma or cellulitis. The signalment, history, clinical appearance and evidence that the process is sterile support the diagnosis and biopsy may be used for confirmation.

Pemphigus foliaceus may present with primary lesions (papules and pustules) or secondary lesions (crusts). The lesions can be noticeably similar to superficial folliculitis, bullous

impetigo, and superficial spreading pyoderma. One particularly important characteristic of pemphigus foliaceus is that it often affects areas that are rarely affected by pyoderma, such as the face, concave pinnae, paw pads, and nasal planum. However, pemphigus will occasionally spare these areas resulting in confusion. Cytology and histology findings are valuable in determining the diagnosis. The lesions are characterized by sterile neutrophilic pustules with abundant acantholytic cells.

Eosinophilic folliculitis and furunculosis is a papular, nodular, crusting, exudative dermatitis, typically of sudden onset, that occurs primarily on the face and occasionally on extremities. Exact etiology is unknown but insect bites are thought to play a role. The condition is not pruritic but can be painful.

Mucocutaneous pyoderma most commonly affects the lips and perioral skin. The nares and nasal planum are less commonly affected. The vulva, prepuce, perianal region, and eyelids may also be affected. Clinically, erythema, swelling, with crusts, fissures, erosions, and ulcerations may develop. The development of mucocutaneous pyoderma can be secondary to underlying disease entities such as atopic dermatitis. This disease can resemble discoid lupus erythematosus closely and biopsy may not differentiate the two disease processes. However, mucocutaneous pyoderma treated with appropriate antibiotic therapy will resolve albeit slowly in some cases.

Bullous impetigo more commonly affects immunosuppressed adult dogs. Bullous impetigo is characterized by non-follicular pustules. These flaccid pustules typically range from 5 to 15 mm in diameter. Contents can appear yellow, white, or light green in color with a margin of erythema. These pustules rupture easily and become crusted. Mild acantholysis may be noted and although less common profound acantholysis may occur. Exfoliative toxins that digest canine desmogleins 1 and induce superficial epidermal acantholysis have been identified in *Staphylococcus pseudintermedius.*

Impetigo is superficial pyoderma affecting puppies and young dogs. Like bullous impetigo, it is characterized by non-follicular pustules but they are more frequently associated with non-haired areas of skin such as the caudal abdomen and axillae. True impetigo is non-pruritic. Often, the etiology is unknown but it can be secondary to immunosuppression, poor nutrition, or sub-standard living conditions. Spontaneous resolution is typical but topical or systemic treatment can hasten the process.

Deep pyoderma is a serious bacterial infection affecting the dermis and subcutaneous tissue and is often accompanied by concurrent systemic signs. It can be localized, as a result of trauma or generalized, typically the continuation of a superficial infection. Superficial pyoderma can give way to deep pyoderma when infection ruptures the hair follicle wall and extends down into the dermis and subcutis. Panniculitis and cellulitis can also occur when the infection continues to spread deeper to fatty tissue. Fistulas can form when the infection follows tissue planes to the surface.

Post-grooming furunculosis is an uncommon yet distinctive subgroup of deep pyoderma. This process has an acute onset 24-48 hours following a bath, hand stripping, or aggressive brushing. Lesions typically develop over the dorsal trunk and consist of pustules, hemorrhagic bullae, and fistulae. The affected areas are typically painful upon manipulation. This unique history and the rapid development of clinical signs are suggestive. Cytology often reveals gram-negative bacteria. Culture and susceptibility testing is recommended due to the unpredictable sensitivity profiles of these organisms. Community bottles of shampoo and conditioner should be avoided. Grooming implements should be sterilized and if possible bathing should be delayed for 2 or more weeks following hand stripping of the coat. Empirical therapy with an antibiotic targeted at gram-negative bacteria is appropriate pending culture results.

Nasal folliculitis and furunculosis is an acutely present, progressive pyoderma affecting the bridge of the nose and skin around the nostrils. Initially, papules and pustules can be seen with secondary lesions from self-trauma as a sequela. Etiology is unknown but trauma may be an inciting factor. Many breeds are predisposed with German shepherd dogs, bull terriers, and hunting dogs at the top of the list.

Acral Lick dermatitis/furunculosis is a distinctive and often frustrating dermatologic condition. Recognized by thickened, raised, hairless plaques that may or may not be ulcerated or dispersed with draining tracts, acral lick lesions are typically found on the distal portion of limbs. Chronicity of the lesion can affect the appearance. Underlying causes can range from organic to psychogenic, with general opinion shifting away from the latter. Trauma, joint pain, neuropathy, infection, neoplasia, and allergy should be ruled out before considering psychogenic causes. Whatever the inciting factor for licking, once started, a feedback loop is established. Licking erodes the skin which leads to ulcerations which become secondarily

infected. The area becomes hyperplastic and fibrotic. The damage can also contribute a local foreign body reaction which only causes more licking.

Superficial spreading pyoderma, a sub-type of exfoliative superficial pyoderma, is a common bacterial skin disease in dogs. It is often clinically recognizable as rapidly expanding, erythematous, pruritic epidermal collarettes which frequently affect the axillae and inguinal regions. However, it may present with a more dramatic appearance dominated by centrifugal peeling of the superficial layers of the skin with ultimate formation of very large collarettes with peripheral erythema (more common in: Collies, Border Collies, Australian Shepherds and Shelties). Treatment with topical management or systemic antimicrobials usually affords resolution but recurrence is common.

A subtype of exfoliative superficial pyoderma that resembles staphylococcal scalded skin syndrome in humans exists. It is typified by acute onset of regionalized or generalized erythema and large sheets of overlying scale.

Bacterial overgrowth syndrome is not classified as a pyoderma because there is not a pyogenic response. However, it can mimic the appearance of Malasseziasis in dogs. It is typified by pruritus, greasiness, odor, lichenification, hyperpigmentation, and erythema often affecting the ventrum including the axillae and inguinal regions. As is the case with Malasseziasis, it is often secondary to allergic skin disease. Topical therapy plays an important role in the management of this condition.

Diagnostic tests: Cytology, culture and sensitivity testing, and biopsy

Summary

Canine pyoderma is common and of “easy” but there are clinical presentations that can prove to be diagnostic challenges. Cytology should be heralded as being the most useful tool in the toolbox. Culture and sensitivity testing is becoming increasingly important with the rise of multi-drug resistant organisms. Dermatopathology although seldom necessary for the evaluation of pyoderma is essential in the differentiation of conditions which have similar clinical and cytological characteristics.

In-House Diagnostics: What We Miss by Not Looking

A comprehensive review of in-house diagnostic tests for dermatology including efficient sampling techniques. Improving efficiency while maintaining quality improves clinical outcomes and profitability. Improved biopsy site selection and collection increases the diagnostic value of skin biopsies. Techniques for successful collection of biopsies and closure of biopsy sites in special areas such as noses and paw pads will be reviewed along with the other more common in-house diagnostic tests.

- Dermatology cases should serve as a rewarding profit center for small animal practice. However, it is essential that the clinician approach dermatology cases systematically. Many of the diagnostic tests in dermatology are easily performed and, with practice, interpreted accurately.

Review of Diagnostics

- Skin scraping/hair plucks should be performed to identify various ectoparasites such as *Demodex, Sarcoptes, Notoedres, Cheyletiella,* and *Trombiculids*
  - Required materials include a #10 scalpel blade or stainless steel spatula, hemostatic forceps, mineral oil, glass slides, and microscope (4 and10 objectives +/- 20)
  - Procedure
    - Affected areas should be sampled when present.
    - Gently squeeze the areas to be sampled.
    - If using a blade or spatula, apply a small layer of mineral oil to the leading edge. Then, scrape in the direction of hair growth until capillary ooze is noted at the site(s).
    - If performing plucks, hemostatic forceps are utilized to epilate hairs at the affected areas.
    - Samples collected are placed in mineral oil that has been applied to a clean glass slide.
    - The sample should be viewed at a magnification of 40-200 (4-20 objectives)
- Diascopy is a simple but useful technique to determine if an erythematous lesion is caused by vasodilatation as in urticaria versus ecchymotic or petechial lesions.
  - A glass slide or a translucent piece of plastic is utilized to apply pressure to the lesion in question. If the lesion blanches (turns white), the lesion is due to vasodilation as seen with urticaria. However, if the lesion does not blanch, the erythema is due to red cell leakage from the vasculature into the dermis as seen in vasculitis.
- Cytology

- Cytologic examination can provide an enormous amount of information and allow the clinician to form a more concise list of differential diagnoses. Although cultures and biopsies will provide some of the same information, these tests require more time and greater expense. Cytology is one of the most rewarding in-house diagnostics available.
- Five of the more common methods of specimen collection for cytological examination include:
  - Direct smear: A glass slide is utilized to collect exudates from moist lesions, pustules, papules, erosions, and ulcerations.
  - Acetate tape impression smears: Clear acetate tape is utilized to collect a sample from an area of interest (dry, lichenified, greasy). Then, the tape is processed without heat fixation and if Diff Quick is utilized, the first stage of stain (alcohol) is omitted.
  - Needle aspirate: A 20-27 gauge needle and 3ml syringe are utilized to collect a sample from a nodule, tumor, cyst, or other masses. The sample collected is gently placed on a slide and smeared.
  - Swab smear: cotton-tipped applicators are utilized to collect material from draining tracts, ears, and interdigital lesions. Then, the swabs are rolled onto clean glass slides. If the lesion is dry, a saline moistened swab can be utilized to collect the sample.
  - Scraping: a spatula, scalpel blade, or glass slide is utilized to collect material from crusted lesions, claw folds, and scaly lesions. Once collected, the sample is gently smeared over the surface of a glass slide.
- **Stains**
  - Heat fixation should be performed on most samples except for needle aspirates from sites suspected to be neoplastic.
  - Diff Quick is a modified Wrights stain and is a Romanovsky type stain. It gives less nuclear detail than a supravital stain, such as new methylene blue, but better differentiation of cytoplasmic structures and organisms.
  - Stains should be maintained fresh and clean. Ideally, one set of stains for blood smears.
- **Cytological Findings**
  - Everything must begin with learning what to expect with normal cutaneous cytology. Different regions may have local differences. So, evaluate normal animals at the

sites where skin lesions are common. This includes sampling the claw folds, interdigital spaces, ears, lip folds, and axillary region.

- Melanin and keratohyalin granules must not be mistaken for bacteria.
- Bacteria can be visualized in stained specimens and, although the type of bacteria cannot be determined, the morphology can be determined. Knowing whether the bacteria are rod shaped or cocci shaped is useful in choosing empirical therapy.
- Cytology is useful in determining the need for additional diagnostics such as culture or biopsy.
- Normal dog skin has an average number of less than two cocci or rods per oil immersion field.

- **Cytological Interpretation**
  - Evaluate the cytological response of the skin.
    - Are inflammatory cells present? If so, what types are identifiable?
    - Are there eosinophils? If so, consider allergic, parasitic, and furunculosis lesions.
    - Are there neutrophils? If so, do they have degenerative or toxic changes to suggest infection? Is phagocytosis present?
    - Are there acantholytic cells? If so, consider suppurative skin disease, dermatophytosis, or pemphigus.
    - Are there lymphocytes, macrophages, and plasma cells (granulomatous inflammation) or lymphocytes, macrophages, plasma cells, and neutrophils (pyogranulomatous)? Infectious versus sterile causes (furunculosis, foreign body, granuloma pyogranuloma syndrome, metatarsal fistulae) should be considered.
  - Bacterial colonization is where only extracellular bacteria are seen.
  - Deep bacterial infection is where a mixed cellular infiltrate with large numbers of histiocytes, macrophages, lymphocytes, and plasma cells are seen and fewer bacteria with greater number of intracellular bacteria.
- Cytomorphological characteristics of malignancy
  - General findings: pleomorphism, variable nucleus to cytoplasm ratios, variable staining intensity
  - Nuclear findings: marked variation in size, coarsely clumped chromatin, nuclear molding, prominent nucleoli
  - Cytoplasmic findings: variability in staining intensity, variability in amount

- Cutaneous cytology provides a clinician the opportunity to practice better medicine while increasing profits within the practice.

❖ Trichogram (Hairshaft analysis)
- Utilized to visualize the hairs for evidence of self-trauma, growth phase, pigmentary disorders, and fungal infection.

❖ Wood's lamp emits ~253.7nm of ultraviolet light which is passed through a cobalt or nickel filter. The lamp needs to warm for 5-10 minutes to allow the light's wavelength and intensity to stabilize as they are temperature dependent. The examination must occur in a dark room. 30-80% of Microsporum canis strains will fluoresce a yellow-green color. The hair coat needs to be exposed for 3-5 minutes since some strains are slow to fluoresce. Some bacteria, keratin, soap, petroleum, topical medicaments, and scale may cause false-positive results. Less common dermatophytes that may fluoresce under a Wood's lamp include *Microsporum distortum, Microsporum audouinii,* and *Trichophyton schoenleinni*. Dermatophytes do NOT form macroconidia in tissue. If they are seen, they may be from saprophytes.

❖ Fungal culture (DTM)
- Sample collection for dermatophyte culture includes hair plucks based lesion type or based upon Wood's lamp examination and the McKenzie (toothbrush) method. *Trichophyton* spp. and *Microsporum persicolor* may have hyphae only in the stratum corneum necessitating a skin scrape (no mineral oil) for sample collection. Once inoculated, the fungal cultures should be evaluated daily. Macroconidia isolated from a DTM allows for identification of the dermatophyte type. Macroconidia are collected from the culture using clear packing tape or Scotch tape. The sticky surface of the tape is applied to the colony surface and removed. The tape is placed on a glass slide that has 2-3 drops of lactophenol cotton blue applied. Then, the slide should be evaluated to determine if macroconidia are present and if present their identity.

❖ Biopsy with skin disease in mind
- Cutaneous biopsy collection and submission techniques are just as important as the dermatopathologist selected to interpret the biopsy.
- A detailed list of differential diagnoses, clinical lesion descriptions and distribution, treatments, and responses should be included and clinical photos if possible.
- The histopathology report should support or negate the list of differentials provided.
- A dermatopathology service should be utilized or a pathologist with a special interest in dermatology if a dermatopathologist is not available.

- Lesion selection
  - Primary lesions are preferred under most circumstances, secondary lesions may have value but the tendency for this is less.
  - New lesions should be selected or if there is a progression of lesions present, a sample of each stage should be considered.
  - Acquire several samples from representative lesions. More than one problem may exist, so don't limit your success.
  - Remember that not everything will come easily. Nasal plenums and paw pads will have to be biopsied and they provide crucial information when they are abnormal.
- Procedure
  - Identify each proposed biopsy site. Typically, a permanent marker outline is adequate.
  - Local anesthesia is adequate for most sites, exceptions being claws, paw pads, noses, eyelids, and lips for all but the most stoic of patients.
  - Lesions should not be cleaned or otherwise prepped.
  - A biopsy punch is the most convenient sampling device in most cases except in very large lesions where an elliptical surgical biopsy is best.
    - Biopsy punch size should be based upon lesion size and location. I will seldom use a biopsy punch smaller than a 6mm in diameter. Typically, I prefer an 8 mm punch.
  - The punch should be centered over the primary lesion and while applying constant and steady pressure, the biopsy punch is rotated in a single direction. Upon complete penetration of the punch, the punch is removed taking care not to disrupt the lesion. Then, the sample is lightly grasped by the subcutaneous tissue (not the skin) so that the deep attachment can be severed with scissors.
    - Small samples should be placed on piece of tongue depressor or paper to maintain a flat sample prior to placing in 10% formalin fixative.

- Intradermal skin testing versus serum allergy testing
  - Most dermatologists consider intradermal skin testing the gold standard for identifying allergens in the atopic patient. This diagnostic test is not typically feasible to perform in most general practice settings due to upfront costs and shelf life of the antigens.
  - If a referral institution is not readily available for your patients, serum allergy testing should be considered but each lab has advantages and disadvantages.

- There are many inexpensive in-house diagnostics that can and should be performed in practice. These simple tests will improve the outcomes for your patients and the bottom line in the practice.

  Biopsy is an important diagnostic tool and is required in a multitude of dermatological disorders. However, choosing when it is appropriate to biopsy, where to collect biopsies and with what expected result is challenging. Biopsies can be tough with certain body locations and lesion types. Clinical pearls to improve sample quality and ideally diagnostic value from the eye of the dermatologist and the dermatopathologist. Dr. Jeanine Peters-Kennedy and I share our thoughts on getting the most from your biopsies.

  As everyone does, dermatologists and pathologists have their own pet peeves, and some examples are listed below:
    - The condition is widespread but only a single biopsy punch is submitted.
    - Crusting skin lesions are present, but no crusts are submitted.
    - Collecting punch biopsies at the margin between normal and abnormal.
    - Collecting punch biopsies in the center of an ulcer.
- Biopsy "The When"
  - When lesions are acute and severe
  - When therapy is associated with significant risk or side effects
  - When the lesions are different, weird, or neoplasia is suspected
  - When new or different lesions develop while undergoing therapy
  - When lesions fail to respond to what is felt to be appropriate therapy
- Biopsy "The Where"
  - Primary lesions should be sampled first.
  - Biopsy all suspect lesions, this is especially true in cases where primarily lesions are not identifiable. Secondary lesions should be sampled if they represent a significant part of the process. Collect additional crusts and submit them.
  - Where pigment is altered collect gray areas or the margin between pigment and non-pigment.
  - Where ulcers are present, collect on the margin of intact skin extending towards the ulcer.
  - Where alopecic, collect samples from alopecic, partially alopecic, and normal areas and label as such.
  - Where nodular diseases are present, excise a nodule.
- Biopsy "The Why" and "The Why Not"
  - How to collect skin biopsies and why it should be done in the described fashion.
    - Never scrub the skin surface.
    - Trim longer hair with scissors or clippers but do NOT disrupt or touch the skin surface.
    - When local anesthesia is utilized do NOT inject dermally. Place a small bleb in the subcutaneous tissue beneath the proposed biopsy location.
    - Center the lesion with the biopsy punch and rotate the punch in one direction with downward pressure until it sinks well into the subcutaneous tissue.
    - Do NOT grasp the skin sample with tissue forceps. If necessary, grasp the deepest portion of the subcutaneous tissue with small thumb forceps. An iris scissor works well to excise the subcutaneous tissue.
    - Blot on a surgical sponge to remove excess blood from the tissue and place in formalin immediately.

        - For thin tissue samples, place tissue on a cardboard or a piece of tongue depressor to minimize curling of the sample.
        - Do not biopsy within an ulcer.
        - If it won't fit into the biopsy punch, consider an elliptical incision instead.
        - Do not utilize cautery or laser on small biopsy samples.
        - Avoid using anything less than a 5mm punch.
- Practice Pearls when biopsy is necessary in those "Special Places"
    - Nasal
    - Concave ear pinna
    - Paw pads
    - Claw
    - Oral cavity
- Sample submission
    - Include a concise history with lesion descriptions, locations, presence or absence of pruritus, duration of lesions, tests performed and results, previous medications/current medications perceived response, and differential diagnoses.
    - Photographs and a body map are helpful.

Special thanks for Dr. Jeanine Peters-Kennedy for her thoughts on this topic!