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Infection control and prevention in canine allergic skin disease (Atopic dermatitis)

Why do allergic dogs get re-occurring infections?

Atopic dogs, have a different microbial flora of the skin to normal dogs. Normal dogs have a diverse balanced population of bacteria on the skin. Allergic dogs have increased number of pathogenic staphylococci and sometimes yeast on the skin. This is due to the allergy altering the local barrier function and structure of the skin. We call this an alteration of the skin microbiome skewed towards increased pathogens. Interestingly enough, these dogs also have altered gut flora, with a decrease in bacterial diversity. Once the allergies are controlled, importantly, the skin microbiome begins to return to normal.

What do infections look like?

Generally there is an increase in itching and drugs that are used to control the itching no longer are effective.

Bacterial folliculitis (superficial pyoderma) begins as pimples (papules or pustules) which then spread across the skin as epidermal collarettes. These circular lesions are confused by some owners and vets as ringworm. They are not. They are spreading staphylococcal infection.



Deep infections are tracking through the dermis or subcutis. The skin is inflamed and draining red or yellow pus



Treatment of canine pyoderma

This article is not meant to detail treatment and readers are directed to the current consensus guidelines on the treatment of canine pyoderma.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC12058580/>

In summary, topical treatment in most cases will deal with superficial pyoderma, papules pustules and collarettes. My current protocol includes:

1. Chlorhexidine shampoo with 10 min contact time followed by chlorhexidine conditioner (Pyohex , Dermcare) initially twice a week.
2. Local treatment of spot areas twice a day with 2.5% chlorhexidine solution, freshly made up from concentrate then applying an antiseptic cream. My preferred option still remains silver sulphadiazine. The Flamazine product has been discontinued however other sources are available including compounded product.
3. In general antibiotics are contraindicated for superficial pyoderma except where topical treatment has failed or the condition is so severe the owner cannot treat it effectively. If they are used, antibiotics should be based on culture because of resistance.

Deep pyoderma always needs antibiotics in addition to topical treatment. Culture is obligatory.

The protocol for the duration of treatment has altered.

- Superficial pyoderma: two weeks then re-evaluate.
- Deep pyoderma: three weeks then re-evaluate.

Prevention of re-occurring infections.

The most important thing is to control the underlying allergic skin disease. Control the allergy and return the microbiome of the skin to normal.

Poorly controlled allergic dogs get re-occurring infections due to loss of microbial diversity through alterations in the skin structure and function.

To control the allergy your veterinary practitioner or veterinary dermatologist will use a combination of the following:

- Drugs to dampen the inflammatory response to allergenic triggers. JAK inhibitors (eg Apoquel or Zenrelia) , interleukin 31 blocking monoclonal antibodies (eg Cytopoint) and short term corticosteroids (prednisolone).
- Identification of triggers that can be controlled. Food or parasites.
- Immunotherapy (desensitization)
- Antihistamines are mostly ineffective but can help a small number of dogs. Fexofenadine or cetirizine are the ones most commonly used. Most dogs do not get a good result because canine atopic dermatitis is a cytokine driven disease not histamine based one.
- Omega three fatty acids as found in fish oil have been shown in dogs to reduce the dose of drug required over time. The benefits are a reduction of drug dosages in a significant number of cases however on their own omega-3 fatty acids are generally ineffective. An indicative dose for fish oil in the dog is 3 to 4 mL per day in divided doses. Remember that fish oil degrades rapidly if exposed to light or oxygen in the air.
- **Disinfectant shampoos.** In many cases disinfectant shampoos used once a week such as Pyohex chlorhexidine shampoo followed by Pyohex chlorhexidine conditioner is enough to stop infections. Plan B is to add in mid week application of the conditioner or chlorhexidine mousse after wetting the skin. Research has shown that disinfectant shampoos assist in restoring the normal microbiome of the skin and reduce staphylococcal levels. This benefit ceases when shampoo therapy is suspended.
- Some cases require more aggressive ongoing topical therapy using spray on bleach daily (my protocol is 4 teaspoons of 4% hypochlorite bleach and 1 teaspoon of Bath oil in 1 L of water). If using bleach always treat a local area first to make sure there are no reactions. Bleach degrades quickly so always use fresh solutions and new stock bottles.
- Silver containing shampoos or sprays are showing promise. These are not commercially available in Australia.

Autogenous staphylococcal vaccines. These have been shown to be effective however, in Australia, the laboratory producing staphylococcal vaccines for dogs no longer holds a permit to do this. They are available in Europe. Hopefully we can restart using these to help prevent infections as they are often quite effective in reducing the incidence of bacterial infections.

Prebiotics and probiotics. Prebiotics are indigestible fibre-containing supplements which promote an increase in gut microbial diversity. “Feeding the biome”. Probiotics are live microbial organisms “good bacteria” which also enhance gut bacterial diversity. We do know that dogs with atopic dermatitis also have abnormal gut bacteria. We know that as the skin microbiome returns to normal as the allergies are controlled so does the gut microbiome. There is crosstalk between the gut and skin microbiomes (gut skin axis).

At this point, as far as feeding prebiotic and probiotic supplements to help control skin allergy the evidence is not fully conclusive. Studies show improvement in some cases however major turnaround of severe allergic dogs does not occur with these supplements alone. There is a consensus that these supplements may help. We do not know which brand or type of supplement to recommend. Price has nothing to do with result.

At this stage, my recommendation is to use:

- Psyllium husk from the supermarket. Dose rate roughly the human dose rate for larger dogs and half the human dose rate for smaller dogs. Always begin with a lower dose.
- Any generic probiotic supplement with a good variety of bacterial ingredients particularly lactobacilli. Again price is not important.
- Be careful in food allergic dogs

Topical probiotics. We do know that lactobacilli will inhibit staphylococci and yeast growth. We also know that topical lactobacilli, applied once or twice a week to the skin, remain in increased levels on the skin surface. There are no commercial products available however to spray on a home-made formula of probiotics lactobacilli on a twice weekly basis has the potential to assist.

Antibiotics should be avoided unless there is no other option.

- Antibiotics decrease the diversity of the skin microbiome.
- Increase resistant populations of canine staphylococci.
- Transferring antibiotic resistant E. coli and other bacteria to owners.
- Contamination of the environment and waterways and general increase in resistant populations of bacteria.