

# What Is The Skin Barrier And Why Does It Matter?

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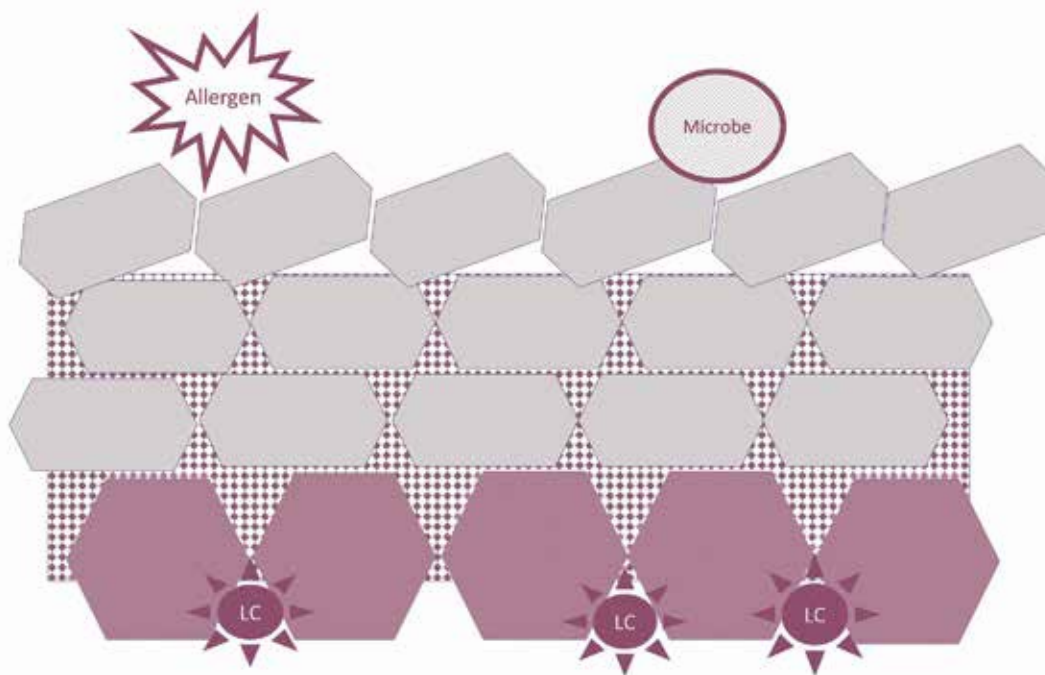
We are all aware that Westies are one of the breeds predisposed to atopic dermatitis, a chronic lifelong skin disease associated with itch and inflammation. Atopic dermatitis is a genetic disease with environmental triggers. Allergens include pollens, molds, dusts, danders, insects, and mites, but flares can be triggered by irritants (soaps, detergents), temperature changes (especially hot water), and even stress. Food allergy can be part of the disease, and affected dogs can become allergic to the staphylococcal and yeast organisms that frequently infect their skin. Affected dogs have a dysregulated immune system, which we have known for years. More recently, it has become clear that the skin itself is abnormal.

## What Is The Skin Barrier?

The skin barrier consists of the very surface layer of skin cells, the corneocytes. In normal skin, these cells are arranged in an orderly fashion, and are surrounded

by lipids, consisting of ceramides, cholesterol, and fatty acids. We call this the “bricks and mortar” model. (See *Figure 1A*). One of the purposes of the skin barrier is to keep allergens and microbes out and hold water in. In atopic dermatitis, this skin barrier is disrupted. The skin becomes more porous and leaky, which allows allergens and microbes to penetrate more deeply into the skin, where they contact and activate the immune system (*Figure 1B*). When dogs have a skin barrier defect, their skin tends to be more scaly and dry than normal, which contributes to the itch. Skin barrier defects may be intrinsic in some atopic dogs, but any time a dog gets a skin infection with bacteria or yeast, the skin barrier is disrupted.

We know that there are many genes involved in the abnormal allergic response, and the same is true for the skin barrier. We are beginning to learn that different breeds have different sets of immune and skin genes affected.



**Figure 1A.** Cartoon structure of the normal skin barrier. Grey shapes are cells of the barrier. Checkerboard represents the lipid. LC, Langerhans cells, the activators of the immune response.

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Hopefully in future, we can use this information to design better treatments for these dogs, but even now we can help the skin repair itself with good nutrition and with the application of lipids directly to the skin.

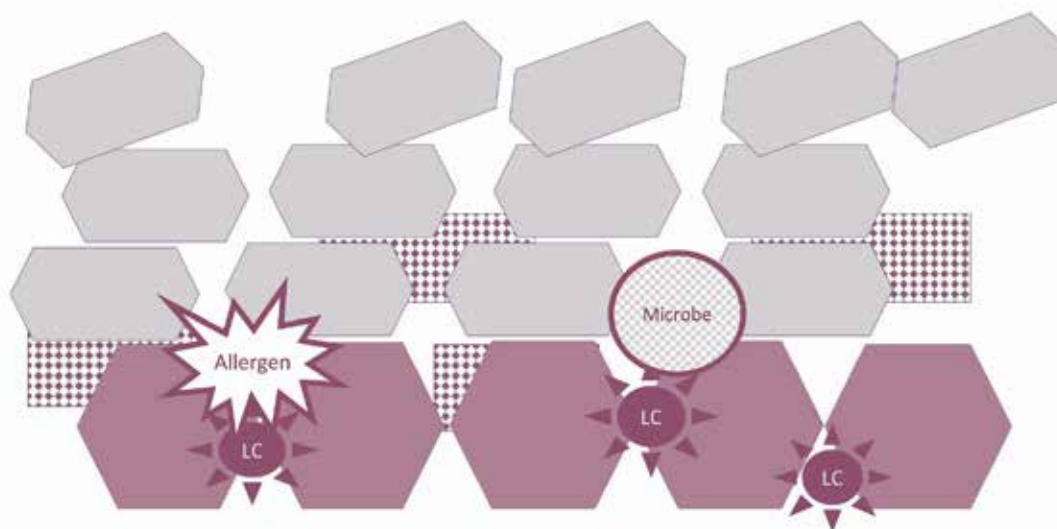
## How Can We Repair It?

We have two ways to improve the function of the skin barrier: nutrition and topical therapy.

**Nutrition:** Diets enriched in the optimal ratio of omega-6 to omega-3 essential fatty acids as well as key nutrients (anti-oxidants, phytonutrients, vitamins, minerals, high quality protein) have been shown to improve the skin barrier and reduce the skin inflammation associated with atopic dermatitis. It is important to note that these diets are not meant to help diagnose a food allergy, but they are extremely helpful for atopic dogs. Examples include Hill's Derm Defense™, Royal Canin®'s Skin Support, and Purina Pro Plan Veterinary Diet® DRM. Many dogs have also done well with Hill's Prescription Diet® J/D® as well. Except for DRM which contains trout as its animal protein, these diets do contain chicken, and therefore would not be appropriate for a dog allergic to chicken. Each of these are high quality veterinary prescription diets and readily available with a prescription from your veterinarian. Utilizing these diets as part of your management plan can contribute greatly to the well being of your allergic dog.

**Topical:** There is good support for the beneficial effects of applying lipids directly to the skin. We have always advocated for washing dogs with a non-irritating shampoo, because it soothes the skin and removes allergens and microbes. When dogs have infected skin, there is nothing that will make them look better, feel better, and smell better than having a good antimicrobial bath in tepid to cool water! Now our veterinary shampoos contain lipids that have been proven to help the skin repair itself over time. These lipids include phytosphingosine, ceramides, and fatty acids; so far, we have no evidence to say that one of these is superior to the others. These lipids can be combined with other ingredients such as chlorhexidine and either miconazole or fluconazole to help battle infections. The beautiful thing about using these products is that while we recommend using them frequently initially, as time goes on, frequency can be reduced. And in addition to shampoos, we have sprays, mousses, wipes, and spot-ons, so there is a way to get topical lipid therapy to every patient who would benefit.

Phytosphingosine is actually a component of the skin and is a building block for ceramides, one of the major lipids in the skin. The most familiar brand for most of us is the DOUXO® line, originally produced by Sogeval and now by Ceva (<https://www.ceva.us/Companion-Animals/Dermatology>). There are several shampoos,



**Figure 1B.** Cartoon structure of a disrupted skin barrier. The lipids are disorganized and decreased; allergens and microbes can penetrate deeply to activate the Langerhans cells and start the abnormal allergic immune response.

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sprays, mousses, and wipes that contain phytosphingosine. Ceramides are contained in a number of products, including those made by Dechra (containing ceramide complex <https://www.dechra-us.com/therapy-areas/companion-animals/dermatology>) and Vetbiotek (ceramide III <https://www.vetbiotek.com/dermatology-products>). Again, there are shampoos, sprays, mousses, and wipes. Fatty acids are contained in HyLyt® shampoo (DVM brand, Bayer Animal Health <https://www.bayerdvm.com/products/hylyt-shampoo/?pref=all>) as well as in a number of products made by Dermoscent® Laboratoire (<http://www.dermoscent.com/en/>).



## A Special Role For Spot-Ons

As we have said, bathing is one of the best things we can do for our dogs with atopic dermatitis. But there is a role for spot-ons and they are very easy to use. DOUXO® Spot-on is a pure solution of phytosphingosine which can be applied once to twice weekly initially, then as needed. It is odorless, clear, nongreasy, and can be used on cats as well as dogs. It seems to work best for local areas (e.g. ears, abdomen). More than one pipette may be needed for larger dogs.

Dermoscent® Laboratoire has two spot-ons, Dermoscent® Essential 6 and PYOspot®. These are a mix of highly refined essential oils of herbs and grains that have been shown to improve the skin barrier and rebalance the skin microbiome. There are different doses based on weight of the dogs. Dermoscent Essential 6 spot-on can be used once weekly for 4-8 weeks then as needed; coat skin quality can be improved dramatically. PYOspot is recommended for dogs who are struggling with recurrent pyoderma; work documenting its efficacy in reducing the number of pyoderma outbreaks will be presented at the World Congress Veterinary Dermatology in October, 2020.

## Conclusions:

Barrier repair alone will not control all the signs of atopic dermatitis, but it can help speed recovery and reduce infections. When combined with an effective treatment to control itch and inflammation, it can greatly contribute to our atopic dogs' wellbeing.

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Lead, guide and advocate on behalf of Westies.

Develop and communicate to Westie owners, Westie breeders, veterinarians and others who share our challenges.