Therapy of fungal and bacterial dermatoses

Diagnostics of atopic dermatitis. Comparison of intradermal and serologic tests.

Nutrition for Cats and Dogs with Skin Conditions
Dear Readers,

“Based on evidence” – in our VetExpert logo is not a coincidence. Since the beginning of our activity we put emphasis on reliable studies supporting the safety, effectiveness and efficiency of our products. Every year, we execute series of our own studies, but also we cooperate with academic institutions, and veterinary practices. We decided to collect the fruits of our efforts and present them to you.

The 1st edition of „Veterinary Life” is a collection of articles and publications on skin problems of dogs and cats. This issue, as well as another editions will constitute a compendium of knowledge starting from individual problems of daily practice, to medical curiosities and market interest. Our magazine is addressed to a wide range of readers related to the veterinary industry not only in Polish but also in other European countries.

Since next editions are already planned, the editorial team is counting on all comments and observations on the current issue, and is eagerly waiting for proposals of topics for the next issues. We also encourage those who want and have an opportunity to cooperate, to present their knowledge, achievements or thoughts in „Veterinary Life”.

Creating and publishing „Veterinary Life” would not have been possible without the involvement of many people. I would like to thank all of them for their hard work and kindness.

Editor-in-chief

Anna Rutkowska
Editor-in-chief

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Therapy of fungal and bacterial dermatoses

Jarosław Popiel  DVM PhD University of Life Sciences in Wrocław, Poland

Skin diseases caused by the proliferation of pathogenic bacteria or fungi are one of the most frequent dermatoses in dogs encountered by a veterinary surgeon.

The therapeutic approach should be varied in these diseases. Pyoderma usually is a secondary pathology resulting from excessive proliferation of commensal bacteria. Dog’s skin is a perfect place for microorganisms. Staphylococcus aureus is a bacteria that colonises almost the whole skin of a puppy from the eighth hour of age, and its dominance remains throughout the whole lifetime of a dog. In healthy dogs, their immune system and tightness of epidermal barrier help keep homeostasis. Each breaking of the barrier, being mechanic or caused by immune deficiencies (other diseases, for instance allergy), causes excessive proliferation of bacteria on the surface of the skin, or – worse – allows microorganisms to penetrate the structures of epidermis and results in pyoderma, sometimes involving subcutis.

Correct treatment always depends on precise diagnostics and specifying whether the problem is external only (bacterial proliferation on the surface of the skin) or is it a superficial or a deep pyoderma. Auxiliary tests, usually cytology (for example Diff-Quick staining), will tell us if the disease is caused by bacterial proliferation, or, for instance, candidiasis. This test does not specify precisely the pathogen, but tells us whether the problematic bacteria are cocci (usually staphylococci), or rods (Pseudomonas spp., Proteus spp., or others).

Further therapeutic decisions must depend on a few factors: how advanced is the inflammation (acute or chronic), how widespread are the lesions (local or generalised pyoderma), what is the location of lesions (superficial or deep pyoderma), and what is the tendency for recurrence (recurrent pyoderma, often deep).

Whenever rods are found, or a generalised, deep or recurring pyoderma is diagnosed, a sample should be taken for culture and antibiotics should be selected based on an antibiogram.

A crucial element of treatment of pyoderma is shampoo therapy, namely prescribing a correctly selected medicament product in the form of a shampoo or a foam. In cases of local or superficial bacterial inflammation such treatment might replace the use of antibiotics. The most frequently used antibacterial substance is chlorhexidine, present in a variety of products in different concentrations (from 0.5% up to 4%). 0.5% solutions can be successfully used in treatment of pyoderma. Chlorhexidine solutions are efficient against yeast as well. Other substances used in lagoons, shampoos or foams for treatment of pyoderma are: benzoyl peroxide, metabolised in the skin to benzoic acid with strong antibacterial action based on lowering of pH of the skin; ethyl lactate with antibacterial action (hydrolysed by bacterial lipase to lactic acid and ethanol) or lactic acid. It is crucial that the shampoo maintains skin pH on the level normal for dogs’ skin. One should remember that – unlike human skin – dogs’ skin is not acidic, on the contrary: its pH is alkaline. Application of the shampoo also helps to moisten the skin and remove keratinised and dead epithelial cells, thus improving skin condition and regulating naturally growing colonies of skin resident bacteria. Because the therapy of pyoderma must be efficient, the shampoo should be used as often as every week until the effect is achieved, and then continued to maintain the homeostasis, for instance every 3 to 4 weeks.

The next stage in treatment of pyoderma is introduction of antibiotics. Recently, attention has been devoted to the growing number of cases with the resistant staphylococci strains isolated from dogs (MRSA and MRSP). As it has a direct impact on human health, use of antibiotics in animals in a careful and responsible manner is frequently recommended. A generalised or recurrent form of pyoderma that is not responding well enough to therapeutic baths forces us to use these drugs. Of course correct doses and timing should be applied. Frequently, antibiotics used to treat purulent conditions of the skin have to be administered in doses higher than normally accepted. The most frequently used chemotherapeutic is cephalixin in the minimum dose of 20 mg/kg or amoxicillin in the dose of 30 mg/kg. If G- rods are found, the drug of choice seems to be marbofloxacin in the dose of at least 4 mg/kg.

Sometimes the antibiogram forces us to use drugs that do not have their veterinary counterparts. In such cases we should remember about the legally binding prescribing cascade (see Table 1: List of doses for antibiotics and bactericidal/bacteriostatic chemotherapeutics). Another equally important element of antibacterial therapy is appropriate long duration of the therapy. The general principle is using the drug until the lesions disappear, and then continuing the drug for about 7 to 10 days longer. In reality, duration of antibiotic therapy depends on how advanced and widespread the pathology is.

In superficial pyoderma, such as purulent and traumatic skin inflammation (hot spot) or impetigo, the treatment usually lasts 7 to 14 days. In the case of folliculitis, therapy may last up to 4 weeks. In cases of deep generalised pyoderma or cellulitis, therapy may last up to 4 weeks. Further therapy requires very strict monitoring of dosing, and the use of adjuvant therapies, such as shampoo therapy or stimulation of the immune system with products like beta glucan.

The therapeutic effect always depends on all of these factors and on correct diagnosis pinpointing the primary disease that caused the secondary proliferation of bacteria on the skin. In the case of cellullitis or deep pyoderma, when purulent fustulas are clinically visible on the skin surface, scarification may occur as an effect of connective tissue proliferation.

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Table 1: Antibiotics and bactericidal/bacteriostatic chemotherapeutics used in the treatment of pyoderma in dogs.

<table>
<thead>
<tr>
<th>Name</th>
<th>Dosage mg/kg</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxacillin</td>
<td>22</td>
<td>Every 8 hours</td>
</tr>
<tr>
<td>Amoxicillin-clavulanate</td>
<td>12.5</td>
<td>Every 12 hours</td>
</tr>
<tr>
<td>Enrofloxacin</td>
<td>10</td>
<td>Every 24 hours</td>
</tr>
<tr>
<td>Marbofloxacin</td>
<td>2-4</td>
<td>Every 24 hours</td>
</tr>
<tr>
<td>Cephalexin</td>
<td>20-30</td>
<td>Every 12 hours</td>
</tr>
<tr>
<td>Alfacloxacin</td>
<td>5-10</td>
<td>Every 24 hours</td>
</tr>
<tr>
<td>Cefovecin</td>
<td>8</td>
<td>Every 14 DAYS</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>15</td>
<td>Every 8 hours</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>5.5-11</td>
<td>Every 12 hours</td>
</tr>
<tr>
<td>Lincomycin</td>
<td>22</td>
<td>Every 12 hours</td>
</tr>
</tbody>
</table>

Suppurative mycoses or dermatophytoses caused by Microsporum fungi (M. canis or M. gypseum), Trichophyton (usually T. mentagrophytes) or Malassezia spp yeasts may present with characteristic clinical symptoms in dogs. Focal lesions are frequently found, typically round in the form of alopecic patches, scales and crusts. Sometimes parallelic papules and pustules are found. In some cases the symptoms are similar to the symptoms of autoimmune diseases and may be localized in facial and nasal area, symmetrical, in the form of folliculitis and furunculosis (especially after infection with T. mentagrophytes). Infections caused by Trichophyton in dogs may cause folliculitis and furunculosis of foot pads.

Tab. 1 Antibiotics and bactericidal/bacteriostatic chemotherapeutics used in the treatment of pyoderma in dogs.

Phot. 1 Dermatophytosis: a 3-year-old male Husky; scales and crusts around the eye. Culture results. Trichophyton mentagrophytes

Phot. 2 Impetigo: male dog with symptoms of impetigo: superficial pustular pyoderma in the skin of abdomen inguinal area. Numerous pustules on the skin of abdomen.

Phot. 3 Deep pyoderma: male French Bulldog with widespread lesions suggesting deep pyoderma.
In some cases the symptoms resemble lesions characteristic for seborrhoea, with oily scales. Kerion is a rare form of mycosis – it is a kind of nodular form of furunculosis, characterised with a lot of exudate. The lesions are present predominantly on the face and distal parts of legs. In cases of skin candidiasis, erythematous dermatitis, lichenification and oily seborrhoea are observed. Candidiasis is frequently accompanied by severe pruritus.

Diagnosis of dermatophytosis is based mostly on culture results. The sample containing hair and epidermis taken from hanged areas is a material for fungal culture. Wood’s lamp can be helpful in diagnosing microsporosis, as fluorescence of keratine visible in the lamp light indicates the infection. However, sensitivity of this test only reaches 50%, and only works in respect to keratine. Analysis of hair under a microscope with chlorolactophenol shows the presence of arthropores organised as chains along the hair (in up to 40 to 70% of infected animals). Other recommended tests are skin biopsy and histopathological test that can show the presence of spores in the stratum corneum of the epidermis.

The perfect test for diagnosing skin candidiasis is cytology (Diff Quick staining of skin impression on a slide or tape).

Therapy of mycoses should take into account both topical and systemic drugs.

The drugs of choice in the treatment of skin mycoses in dogs are drugs from the azole group (Imidazole). Azole derivatives replaced the typical anti-fungal antibiotics (for example griseofulvin) on the pharmaceutical market, owing to adverse effects of the latter (hepatotoxicity, carcinogenic action, and so on). Therefore, products available on the veterinary market contain first, second or third generation azole derivatives.

First generation imidazoles are in the form of external use products: clotrimazole, miconazole or econazole. A representative of the second generation is ketoconazole, available on the veterinary market as a shampoo, and in human medicine as a systemic oral drug. Third generation includes itraconazole and fluconazole – systemic oral drugs, not registered for animals in Poland. Likewise, terbinafine (allylammine derivative frequently used in humans) is not registered for animals.

Other drugs, with the local non-specific antifungal action, can also have a therapeutic effect in cases of dermatophytoses.

**Treatment of recurrent otitis externa in dogs – the expert’s approach.**

**Inflammation of external ear canal in dogs** is a common problem in every veterinary practice for pets. However, referrals of patients with otitis externa to specialists remain on the same level, with a slight tendency to increase, which shows that diagnosing and treatment of otitis externa in dogs remains a challenge.

First and foremost, in case of a patient with otitis one should absolutely avoid any shortcuts, instead hold on to specific procedures, avoid reaching for a ready-made otologic product after a brief glance at the ear canal, make sure to perform a thorough otologic exam. This check-up provides a set of answers to questions that will help us arrive at an initial diagnosis, but definitely not the final one.

- Is there erythema at the entrance of the ear canal?
- Is the wall of the ear canal inflamed, with clearly visible blood vessels and oedema?
- Is tympanic membrane visible?

After a thorough otologic exam, the next step is to run a cytology of the material collected from left and right ear canals. Sometimes, however, a thorough otologic exam is not possible during the first visit, because the ear canal needs to be prepared for such procedure: the oedema and pain should be reduced, and/or excessive cerumen should be dissolved. In case of seborrhoeic otitis, a trichogram should be performed.

These tests will make an initial diagnosis and initial therapeutic recommendations possible. Nevertheless, one should be aware that only a final diagnosis allows us to recommend a longer term therapy and be successful in complete treatment of the ear canals.

The success in treatment of otitis externa might be achieved despite several factors predisposing for inflammations or other factors encouraging the development of this pathology. It is worth discussing the differences between the two types of factors, as...
they are the essence in pathogenesis of otitis externa, and still they tend to be omitted by practitioners. The predisposing factors in- clude environment. Frequent contact with water macroscopically irritates the epithelium leading to imbalances within the ear canal wall and dysfunction of immune system of the skin in this area. Other predisposing factors are anatomical obstacles, such as excessive hair growth in the ear canal, recesses, stenosis of ear canal or hanging pinnae.

From a practical point of view, the reasons behind the inflammation of the ear canals should be divided into primary and secondary. Interestingly, patients with primary reasons usually remain the patients of general practice, while patients with secondary reasons become patients of referral clinics. According to the research, primary reasons frequently go undiagnosed. Recommending a medication without finding the primary reason does not lead to the treatment, therefore the referral clinics usually see patients with inflammation caused by secondary reasons. This could mean that a general practitioner seeing a patient with otitis either does not thoroughly examine the ear canal, or in his therapeutic recommendations refers only to the present status and considers the visit completed without running an otologic interview. This is a gross mistake.

Secondary reasons of the inflammation do not bring about pathologic lesions in a healthy ear, hence there is nothing to remove. Involuntary removal of the predisposing factors by patients is therefore key in the treatment of otitis externa. The predisposing factors in- clude environment. Frequent contact with water macroscopically irritates the epithelium leading to imbalances within the ear canal wall and dysfunction of immune system of the skin in this area. Other predisposing factors are anatomical obstacles, such as excessive hair growth in the ear canal, recesses, stenosis of ear canal or hanging pinnae.

Infections within external ear canals are usually of mixed origin, which means it is necessary to start therapy against both yeast and gram posi- tive bacteria, and in certain cases also against gram-negative bacteria. The se- lection of the drug should depend on the result of cytology test and antibiogram. We are aware that in cases of patients with bacterial or endocrinological pri- mary reasons, relapses of inflammation are highly probable. Therefore, after elimination of pathogenic flora within the ear canal, one should create environ- ment preventing further proliferation of the pathogen. The perfect solution is to maintain such an environment con- stantly. In the case of the common patho- gons like Malassezia yeast or staphy- lococci (Staphylococcus intermedius or Staphylococcus pseudointermedius), it is very easy to create in the ear canal an environment that is harmful to the development of these pathogens by obtaining a proper pH level around 4.5.

Of course, the environment itself is not enough. Products having unfavourable effect e.g. antibiotics, antifungal agent or corticosteroids residing in the ear canal should be used only on a regular basis, which does not mean that the external ear canal should be regularly cleaned in cases of patients with a tendency for recurrent otitis. A very fre- quent mistake made by veterinarians and the owners is cleaning ear canals with a cotton swab rolled on forceps. Too much ma- nual or mechanical irritation can result in an inflammation of otherwise healthy ear canal! This is caused by the irritation of the pseudo-stratified lining cells of the ear canal wall and dilation of capillar- ies in this area. Thus, the basic care should consist of flushing ear canals and adminis- tering drops, if necessary, depending on the needs. Simple procedures in cases of the patients prone to inflammation of ear canals - what is essentially a control of the basic reason for otitis - are the key to thera- peutic success and seeing the patient in our practice become a rule rather than an exception. Let us have a look at what this mysterious bioresonance is, starting with some theory and history.

Bioresonance was used for the first time in medicine by Germans in the late 80s. The name bioresonance therapy (BRT) was coined in 1987. The method has been created by a German physician, Dr Franz Morell. The first bioresonance machine was called MORA. In the German Institut für Regula- tive Medizin, a computer-controlled equip- ment for bioresonance diagnostics and treat- ment has been developed and called RICOM.

The therapy uses electromagnetic vibra- tions present in the organism that are su- perior in respect to biochemical processes and control them. Beside physiological (harmonics) electromagnetic vibrations, in the organism there are also pathologic (dis- sonant) vibrations, disruptive ones, caused by pathogens. The total sum of physiologi- cal and pathologic vibrations constitutes the organism’s endogenous vibrations. The spectrum of these vibrations range from ex- tremely long to very short ones. They can be picked up on the skin surface, from tissues and from organs.

These vibrations are processed through state-of-the-art electronic equipment into therapeutic vibrations and transferred back to the patient’s organism. The harmonic fre- quencies are amplified (positive feedback), the resonant frequencies are decreased (negative feedback). The patient’s electromagnetic field immediately reacts to a precisely matched therapeutic signal and in turn transfers to RICOM its changed vibrations pattern. This process is repeated in split seconds. This way pathologic signals in the organism are reduced, and finally removed, while physi- ological regulatory forces start to correctly control biological processes. BICOM equip- ment allows transferring to the organism of a fairly narrow frequency range, thanks to which the therapeutic signal is as precise as possible.

In the case of allergies, the method as- sumes the existence of oscillatory biofield of the organism and the oscillatory biofield of the allergens, and the existence in the pa- tient of allergy enzymes typical for every sensitising allergen. The diagnostic consists in finding these enzymes.
If problems aggravate after the pet was out in the garden – is the problem caused by plants? Or by chemical substances used by the owners in the garden? Yeast fungi are not found only in the old walls and in humid areas, they also present in the soil and on plants.

Allergies are a difficult problem, especially when they are complex, when the observed lesions have been caused by several different factors. How to identify all allergens, we will not be successful.

Przypadek 1
Siberian Husky, samiec 5 lat
Przypadek 2
Bokser, samica 4 lata

Przypadek 3
Pudel królewski, samica 2 lata

Przypadek 4
Chihuahua, samiec 7 lat

Przypadek 5
Dalmatyńczyk, samiec 3 lata
Pierwsza wizyta czerwiec 2013. W wywiadzie stwierdzono: nieprawidłowy apetyt, cierpienie od zmęczenia, nieporadne przewinięcia, przykurzanie się, nieporadne wąskie kłody, łodygę, nieporadna świadomość, nietypowe zachowania.

Genetic dermatoses
1. Impaired zinc absorption
The most serious condition related to zinc metabolism is the lethal inflammation of the skin of distal extremities (Lethal Acrodynatemia, LAD) in ball terriers. The condition has a genetic background and is inherited as an autosomal recessive trait. In ball terriers, it makes the body completely unable to absorb zinc, causing impaired cellular immunity, hampered growth, and serious skin lesions that affect dogs under 6 weeks of age. In some breeds, zinc deficiency further increases the risk of pyoderma, and behavioural changes, such as-idiosyncratic aggression, may also be linked to impaired zinc absorption. In other breeds (Alaskan Malamute, Siberian Husky, Great Dane, Dobberman Pinscher), the condition is not fatal, but may lead to dwarfism in Alaskan Malamutes. The symptoms most frequently develop in the first 3 weeks of life (usually manifested by dry, scaling, scaling skin lesions; scales, pusules, and ulcers on the ears, scrotum, face, vulva, and buttocks). Recommended treatment includes the administration of zinc, which causes skin lesions to subside within 7-10 days. The recommended dose is 100 mg of zinc sulfate twice a day (it may have an emetic effect, it should be administered together with food).

2. Vitamin A-responsive dermatoses
Another condition with a genetic background is the idiopathic seborrhoea found in Cocker Spaniels, Labradors and Miniature Schnauzers. Symptoms include dry and flaking skin that alternates with oily skin, large patches of excessively greasy or scabbed skin on the abdomen and the chest, hair loss, and secondary folliculitis. The condition is treated by administering large doses of vitamin A (6 to 10 times greater than the dog’s daily intake). The dose of 10 000 J.M. is taken for 2 to 6 months, and sometimes throughout a lifetime.

Impaired vitamin A absorption may also be linked to sebaceous adenitis in Poodles, Akitas, Chow Chows and Hungarian Pointers. So far, the only background for the condition has been confirmed for poodles, where it is inherited as an autosomal recessive trait. Treatment includes anti-sebum shampoos, propylene glycol, and the necessary unsaturated fatty acids is also important.

3. Vitamin E-reactive dermatoses
The most important dermatosis that reacts to vitamin E is the primary acanthosis nigricans. In dachshunds. Its symptoms include hair loss, hyper-pigmentation, skin thickening, and secondary bacterial infections. Treatment involves the administration of vitamin E at the dose of 200 J.M. of alpha-tocopherol per day. Recommended treatment high dose, amounting to 10 times the daily intake of vitamin E, and 20 times higher than what the animal needs. Improvement can be expected after around 60 days of systematic treatment.

Food allergy
In cats and dogs, allergies are relatively rare; allergen dermatitis only accounts for 1% of all skin conditions, but food allergy is the third most frequent after airborne aller- gies and flea allergy. It is the cause behind 23% of instances of non-seasonal dermatitis. Discussions have been underway for years to determine whether it is a separate diagnostic unit, or a symptom of a broader clinical issue. It is universally accepted that cats and dogs develop allergies to “well-known” food ingredients, i.e. ingredients they had with hand with for an extended period of time. In dogs, as many as 88% in- stances of food hypersensitivities are aller- gies to beef, dairy products and wheat, i.e. the staple ingredients of their daily diet. For cats, 89% are allergies to beef, dairy produc- ts and fish.

For most owners, skin conditions that affect their pets are a serious problem of a medical, but also aesthetic, concern. They expect the pet to get better quickly, which is not always possible. Skin conditions in animals can have a genetic background (genetic dermatoses) or be related to allergies and food deficiencies. The article discusses conditions in which beneficial effects can be achieved by modifying the diet of the sick pet.

No pruritus and microorganisms, pathogenic change in dogs skin may suggest deficiency nutrient affecting the metabolism of the skin.

Causes of food allergies
It is universally accepted that an immu- nological reaction is caused by temporary contact with an antigen repeated over time, but by its constant presence in food. Specific causes, however, can vary and at least several hypotheses have been raised to account for food allergies in cats and dogs. These include:

1. Early weaning. In this case, a predisposi- tion to allergy may be due to the inade- quate formation of the intestinal bar- rier that prevents food macromolecules from passing into the bloodstream, instead, the molecules enter the lymphatic tissue and are recognized as antigens.
Food allergies – treatment

The most important principle in treating food allergies is to identify the allergen in the first place (such as rabbit, duck, fish, venison, potatoes, sorghum or tapioca). When selecting such ingredients, however, it is worth remembering that dogs can also exhibit cross-sensitivity; the phenomenon has already been attested for beef and milk cases, as well as for lamb and beef.

Introducing a diet therapy in allergies should be based on several principles. Food hypersensitivity can be suspected when pruritus is reduced by half after the animal has been given a new feed. If itching decreases, one should go back to the old diet very carefully to confirm food hypersensitivity and identify the responsible ingredient. However, most pet owners are reluctant to look for the underlying cause of the disease. For them, it is more than enough that the pet gets better, they cannot bear the thought of it scratching again. In most cases, this approach makes it impossible to identify the allergen with any degree of certainty. As a result, the market overflows with various feeds based on atypical sources of protein (duck, venison, fish, rabbit, and recently even kangaroo and alligator), known as elimination diets, which are fed to hyper-sensitive dogs as a standard feed. It should be kept in mind, however, that the proteins in most of these products also come from plants (pea, corn gluten); they contain both animal and plant protein. In theory, they can provide an ideal alternative, as long as the allergen has been identified. If it hasn’t, hydrolysed molecule never exceeds 10 kDa. As a result, these feeds have a high level of water, remains supple and elastic, does not become dry or flake off. In contrast, a chronic food hypersensitivity diet, high in fat, can flake off and crack, and leads to hair loss and decreased elasticity. Thus, they play a key role in maintaining skin integrity. Since they are not produced by the body, they need to be supplied in food, mainly in the form of plant oils (borage oil rapeseed), but also as animal fat. Omega-6 ac-
ids are commonly used in clinical diets for dogs with skin conditions (Bauer, 1994).

Precursors of eicosanoids with anti-
flammatory properties, polysaturated omega-6 acids have an anti-inflammatory and anti-odeomatos effect. Increasing their dietary intake may help lower the re-

duced requirement of n-6 anti-inflammatory fatty acids and eliminate the need for

Protection

Food protein is extremely important for the functioning of skin and hair in thick-

ated dogs (such as Spitz and Shih-Tzu), which use up 30-35% of their daily protein intake for skin and hair maintenance and regeneration. These breeds need to be fed products that are low in protein. An important role in the diet of dark or black-
coloured dogs is also played by phenylalanine and tyrosine, which are used to synthesize dark pigments. Deficiencies in these amino acids cause the skin to turn red, creating a reddish glow on black hair. It seems that a similar mechanism can be observed in black-coated cats as well. For this reason, they should receive twice the minimum recommended dietary intake of these ami-

Pigmentation

Pigmentation

Pigmentation

Pigmentation

Pigmentation

Food allergies – symptoms

The most frequent symptom is itching which develops within 4-24 hours after the allergen has been ingested (especially on paws, jaw and inguinal area). With time, the skin is further damaged by scratching and licking, and a chronic dermatitis develops with papules, hair loss, skin redness, and secondary bacterial infections. Some owners argue that bilateral otitis externa is also a characteristic symptom of food allergy. In cats, typical symptoms include itching, miliary dermatitis, otitis externa, and the eosinophilic syndrome, accompa-
nied by peripheral eosinophilia in 20-50% of cases.

Table 1. Nutrients that affect skin and hair in cats and dogs

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyunsaturated fatty acids from the n-6 family</td>
<td>Part of the hydrophilic barrier of the skin</td>
</tr>
<tr>
<td>Polyunsaturated fatty acids from the n-3 family</td>
<td>Anti-inflammatory properties</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Keratinocyte maturation</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Building the keratin barrier</td>
</tr>
<tr>
<td>Biotin</td>
<td>Polysaturated fatty acid metabolism</td>
</tr>
<tr>
<td>Zinc</td>
<td>Prevents water loss</td>
</tr>
<tr>
<td>Vitamin B complex</td>
<td>Polysaturated fatty acid metabolism</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>Excreted with sebum, prevents the oxidation of fatty acids</td>
</tr>
<tr>
<td>Tyrosine, phenylalanine</td>
<td>Dark hair pigmentation</td>
</tr>
<tr>
<td>Methionine, cystine</td>
<td>Hair growth, keratin generation</td>
</tr>
</tbody>
</table>

Skin conditions related to nutritional deficiencies

Inappropriate food dosage or unbal-
anced nutrition can cause cats and dogs to develop dermatological symptoms. Skin symptoms associated with nutritional defi-
ciences include, above all, the detauro-
red condition of skin and hair (lacklustre, brit-
tile hair, hair loss, dry skin, etc.), usually not accompanied by itching. It is universal-
ally accepted that skin is the first organ to be affected when the pet has been exposed to inappropriate feed for an extended period of time. If skin changes are not accompa-
nied by itching or the presence of micro-
organisms, it is likely that the pet’s diet is deficient in one or more nutrients that af-
fect skin metabolism.

Protein

Food protein is extremely important for the functioning of skin and hair in thick-
ed dog breeds such as Spitz and Shih-Tzu, which use up 30-35% of their daily protein intake for skin and hair maintenance and regeneration. These breeds need to be fed products that are low in protein. An important role in the diet of dark or black-
coloured dogs is also played by phenylalanine and tyrosine, which are used to synthesize dark pigments. Deficiencies in these amino acids cause the skin to turn red, creating a reddish glow on black hair. It seems that a similar mechanism can be observed in black-coated cats as well. For this reason, they should receive twice the minimum recommended dietary intake of these ami-

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Protection

Food protein is extremely important for the functioning of skin and hair in thick-
ed dog breeds such as Spitz and Shih-Tzu, which use up 30-35% of their daily protein intake for skin and hair maintenance and regeneration. These breeds need to be fed products that are low in protein. An important role in the diet of dark or black-
coloured dogs is also played by phenylalanine and tyrosine, which are used to synthesize dark pigments. Deficiencies in these amino acids cause the skin to turn red, creating a reddish glow on black hair. It seems that a similar mechanism can be observed in black-coated cats as well. For this reason, they should receive twice the minimum recommended dietary intake of these ami-

Pigmentation

Pigmentation

Pigmentation

Pigmentation

Pigmentation

Food allergies – treatment

The most important principle in treating food allergies is to identify the allergen in the first place (such as rabbit, duck, fish, venison, potatoes, sorghum or tapioca). When selecting such ingredients, however, it is worth remembering that dogs can also exhibit cross-sensitivity; the phenomenon has already been attested for beef and milk cases, as well as for lamb and beef.

Introducing a diet therapy in allergies should be based on several principles. Food hypersensitivity can be suspected when pruritus is reduced by half after the animal has been given a new feed. If itching decreases, one should go back to the old diet very carefully to confirm food hypersensitivity and identify the responsible ingredient. However, most pet owners are reluctant to look for the underlying cause of the disease. For them, it is more than enough that the pet gets better, they cannot bear the thought of it scratching again. In most cases, this approach makes it impossible to identify the allergen with any degree of certainty. As a result, the market overflows with various feeds based on atypical sources of protein (duck, venison, fish, rabbit, and recently even kangaroo and alligator), known as elimination diets, which are fed to hyper-sensitive dogs as a standard feed. It should be kept in mind, however, that the proteins in most of these products also come from plants (pea, corn gluten); they contain both animal and plant protein. In theory, they can provide an ideal alternative, as long as the allergen has been identified. If it hasn’t, hydrolysed molecule never exceeds 10 kDa. As a result, these feeds have a high level of water, remains supple and elastic, does not become dry or flake off. In contrast, a chronic food hypersensitivity diet, high in fat, can flake off and crack, and leads to hair loss and decreased elasticity. Thus, they play a key role in maintaining skin integrity. Since they are not produced by the body, they need to be supplied in food, mainly in the form of plant oils (borage oil rapeseed), but also as animal fat. Omega-6 ac-
ids are commonly used in clinical diets for dogs with skin conditions (Bauer, 1994).

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Pigmentation

Pigmentation

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Pigmentation

Food allergies – symptoms

The most frequent symptom is itching which develops within 4-24 hours after the allergen has been ingested (especially on paws, jaw and inguinal area). With time, the skin is further damaged by scratching and licking, and a chronic dermatitis develops with papules, hair loss, skin redness, and secondary bacterial infections. Some owners argue that bilateral otitis externa is also a characteristic symptom of food allergy. In cats, typical symptoms include itching, miliary dermatitis, otitis externa, and the eosinophilic syndrome, accompa-
nied by peripheral eosinophilia in 20-50% of cases.
Atopic dermatitis is a complex disease, frequently with a very complicated course, and one that poses several difficulties when diagnosing. Based on the most recent research it is estimated that in the USA about 27% of dogs are affected. The number has considerably grown since 1971 when it was on the level of about 3%. In human medicine the frequency of incidences has been growing systematically as well, especially in developed countries. The available research shows that 10 to 20% of children have contracted this disease. In this article I will try to present the subsequent stages of diagnosing atopic dermatitis and compare diagnostic tests available on the market.

Atopic dermatitis is an inflammatory skin disease with genetic background, accompanied by different level of pruritus and characteristic clinical symptoms. In its immunopathogenesis, the main role is played by specific IgE antibodies against particular environmental allergens. The disease might be inherited, and in the case of children whose parents are at risk of incurring the disease, the probability is about 65%.

In the course of atopic dermatitis, we see a variety of clinical symptoms that might depend on:

- genetic factors (phenotypes related to breed, for instance higher incidence of pyotraumatic pyoderma in Labradors and Golden Retrievers, or podomermatitis of front feet in West Highland White Terriers),
- how lesions are spread (local or generalised),
- stadium of the disease (acute or chronic),
- presence of secondary bacterial or yeast infections and other exacerbating factors.

Another difficulty in diagnosing atopic dermatitis is the fact that similar clinical symptoms may be present in other diseases, and there is a possibility of coexistence of a few diseases at the same time.

Diagnosis of atopic dermatitis should include a few stages:

1. Identification and treatment of other conditions related to long-term pruritus, such as:
   - parasitic diseases caused by fleas, scabies (Sarcoptes scabiei), Demodex spp., Cheyletiella, etc.;
   - skin infections (bacterial or fungal caused by Staphylococcus spp. or Malassezia spp.);
   - allergic skin diseases (flea allergy dermatitis FAD, contact dermatitis, food allergy or intolerance);
   - hypersensitivity to insect bites;
   - neoplastic diseases, for example skin lymphoma;
2. A thorough interview, history of the disease and treatment and a very precise clinical examination to show typical clinical symptoms and characteristic distribution of lesions;
3. Evaluation of skin reactivity by performing intradermal allergy tests or measuring the level of allergen specific IgE antibodies circulating in blood.

The first symptom of atopic dermatitis is pruritus that can be manifested by scratching, chewing, over-grooming and/or licking, or head shaking. Depending on allergens that cause the symptoms, pruritus might be perennial or seasonal. The most frequently affected regions of skin are the facial part of the head, the concave side of pinnae, axillar, inguinal area, perianal area and distal extremities. Lesions in atopic dermatitis are predominantly a result of pruritus and self-trauma. In the acute stage of the disease, erythema and skin injuries related to rubbing prevail. In the chronic form, chronic dermatitis, bacterial and yeast infections, hyperpigmentation and seborrhoea are present.

In order to facilitate the diagnosis of atopic dermatitis, diagnostic criteria have been introduced. They are called Favot’s criteria and are the following:

- age at onset under 3 years of age;
- symptoms present in dogs residing mostly indoors;
- corticosteroid-responsive pruritus;
- chronic or recurrent yeast infections;
- affected peripheral parts of front legs;
- affected pinnae;
- non-affected ear margins;
- non-affected dorso-lumbar area.

If 5 out of 8 criteria are met, sensitivity reaches 85%, and specificity – 79%.

The evaluation of skin reactivity by performing allergic intradermal tests or detection of allergen specific IgE antibodies present in the blood is the last stage of diagnostics workup in this disease. These tests are inherited to identify the allergens, with an attempt to eliminate them from the environment. Knowing which allergens cause the problem is also fundamental to prepare a solution for an allergen specific immunotherapy. However, neither of the tests is recommended as a screen test for atopic dermatitis. These tests should only be used to confirm the clinical diagnosis of the condition.

The major mechanism in immunopathogenesis of atopic dermatitis is type I hypersensitivity reaction, caused predominantly by allergen specific IgE antibodies. It has been shown that also IgG antibodies might coat mast cells, which can also be found in blood free or attached to the circulating neutrophils.

Type I hypersensitivity has two stages: sensitisation and repeated exposition. During sensitisation state, the antigen penetrates the skin and is uptaken and processed by APCs – antigen presenting cells. Next, after maturing, the dendritic cells transfer information to regional lymph nodes. There, Th2 lymphocytes are activated and with the help of certain cytokines they stimulate B lymphocytes to differentiate into plasma cells and produce allergic specific IgE antibodies. These antibodies bind to Fce receptors on the surface of local mast cells, and then can migrate to blood and coat circulating basophils and mast cells present in areas other than skin.

During the next contact of the allergen with skin, IgE antibodies bound on the surface of mast cells recognise the allergen and start a cascade leading to degranulation of mast cells. The released inflammatory mediators cause vasodilation, oedema of the surrounding tissues, accumulation of eosinophils and pruritus.

Intradermal tests make it possible to detect specific IgE antibodies as well as specific IgG antibodies that sensitise mast cells in the skin. Serologic tests, on the other hand, make it possible to detect the level of IgE antibodies specific for individual allergens and circulating in patient’s blood.

**IDT – intradermal tests**

On the skin of lateral side of the thorax, solutions of different allergens are applied intradermally and the resulting reaction in the form of erythema and vesicles is compared to positive control (histamine) and negative control (saline). The results are ready within 5 to 20 minutes. Reactions are evaluated based on the size and strength of the erythema and how the vesicle was induced.

**External inflammation of the lips (cheilitis)**

**Intradermal test in dogs with atopic dermatitis**

**Otitis externa with a visible inner side of erythema earlobe.**
Potential results of intradermal tests should always be correlated with a history of exposure to a specific allergen. This method might produce both false positive and false negative results.

False positive results are rare if dilution of the allergen was correct. Other factors causing false positive reactions may include contamination of antigen solution with bacteria or fungi, irritating action of the solution (especially in case of glycercine-containing ones), inappropriate technique or substances causing a non-immunological histamine release.

False-negative results may happen in the case of atopic dermatitis without IgE antibodies or in situations when the antibody level in the skin was below detection level at the moment of performing the test. A severe skin inflammation and burns might also falsify the results. Some drugs may also cause false-negative results, for example glucocorticosteroids (applied both topically and systemically), antihistamines, drugs changing blood pressure, e.g. tranquilizers. Other reasons for negative results include subcutaneous administration of the allergen, too low dosage of allergens (expired tests, too low volume of injected allergens), stress (both related to fear and systemic diseases), performing the tests too long after exposure to allergens or in the peak of allergen exposure.

Before we consider that we are dealing with a false-negative case, every time we should make sure that we have excluded other diseases with pruritus.

ASIS - Allergic Slang IgE Serology Nowadays the most common method used to detect and measure the level of allergen specific IgE antibodies is ELISA test. Generally speaking, this test works as follows:

- Patient’s serum is added to known allergens in solid-phase, on paper discs or on plates. The serum contains IgE antibodies against these allergens, they become permanently attached to the antigen if the antigen is part of the body complex is created. The surplus antibodies are washed away.
- Next, antiserum against IgE specific antibodies bound with an enzyme is added. Again, excessive amount of antibodies is washed away.
- Finally, a substrate for the enzyme is added and the reaction starts. Its colorful product can be quantitatively evaluated by the colour strength, using a spectrophotometric method.

ELISA tests, antibodies that are bound with the enzyme are polyclonal and/or monoclonal. There is another test available in which instead of these antibodies a recombinant FcR gamma receptor is used with a very high affinity to IgE antibodies in dogs.

False positive results tend to happen more frequently if polyclonal antibodies are used in the test. On one hand, polyclonal antibodies increase the opportunity to detect IgE, but they are not always 100% specific for these antibodies. On the other hand, monoclonal antibodies directed always against the same spot in IgE molecules might miss it if the spot is hidden, for example owing to the change of the spatial shape of the IgE molecule which sometimes happens when the allergen is placed in solid-phase. This situation causes a false-negative result. The method with FcR gamma receptor eliminates cross reactions with IgG immunoglobulins, and a very high affinity of the receptor to Fe region of IgE antibodies makes this method very specific.

Another reason for false-negative results might be the decreased amount of IgE antibodies circulating in the serum, or the fact that the electrotesting does not take into account other immunological mechanisms responsible for the development of atopic dermatitis.

Both methods - intradermal and serologic tests – have got their advantages and disadvantages.

Definitely the fact that the patient doesn’t have to be sedated or his coat shaved, which is more comfortable for the patient, is a great advantage of serologic tests; besides, the result is quantitative. The test is easy to perform and available for every veterinarian. The test can be performed respectively of the patient’s condition; in the case of skin inflammation the intradermal test cannot be performed. In serologic tests the risk of the anti-inflammatory or antipruritic drugs interfering with test result is very low. The disadvantage is the occurrence of false positive results and clinically insignificant results.

Despite of the advantages serologic tests several dermatologists believe that the intradermal tests are the golden standard in diagnosing atopic dermatitis in dogs. Their main advantage is the fact that they test the organ directly affected by the disease. There is also a lower number of clinically insignificant positive reactions, as compared to in vitro tests. The intradermal tests, besides detecting dermal IgE specific antibodies, also detect IgE specific antibodies of the sensitised mast cells. Yet another advantage of intradermal tests is a quick and direct result within less than 20 minutes. Their disadvantages, on the other hand, include the impact of several factors (drugs, hormones, stress), the necessity to learn appropriate technique and interpretation, lack of option to perform the test in the case of a very strong inflammation at the sites and a limited availability for veterinarians.

Atopic dermatitis is a multifactorial disease and can be a real diagnostic challenge. The diagnosis of the disease should always be based on exclusion of other conditions with pruritus and on finding clinical symptoms and other symptoms according to Favoit’s criteria. Intradermal and serologic tests are helpful in diagnosis and detect IgE, but they aren’t always 100% specific for these antibodies. Other methods such as food challenge testing or food elimination diet might be used as screening tests in diagnosing atopic dermatitis. One should remem ber that their main objective is to identify allergens in order to prepare a solution for specific immunotherapy or to attempt to eliminate the allergens from environment.

**Introduction**

Food allergy and food intolerance is an adverse reaction of the organism against food or food additives. Food allergy is responsible for 1% of allergology cases and about 10 to 15% of allergic dermatitis cases in dogs and cats (1,2,3). The characteristic feature of food allergy is the phenomenon of sensitisation to allergens contained in food (proteolysel - agents). Food allergic dogs might show extra oversensitivity to environmental allergens (atopic dermatitis) and other diseases (allergy dermatitis, FAD) (12, 13). The disease usually becomes symptomatic progressively between 4th and 5th year of age, although it can af Lect animals of all ages. From puppies to old dogs, being fed the same food for a long time (4, 5). All dogs diagnosed with food oversensitivity might show extra oversensitivity to environmental allergens (atopic dermatitis, other diseases) (14, 15). The first visible symptoms are erythema and pruritus, which might lead to self-mutilation in the form of alopecia, excoriation, crusts and lichenification. Complications set in very quickly, usually podo meria or Malassezia dermatitis. In some patients the pruritus is mild, and the only symptoms are recurring superficial pyoderma and/or recurring otitis externa. The pru titus always becomes stronger in secondary infections (12, 2). About 20% of patients might have gastrointestinal symptoms like frequent defecation, gas, diarrhea and occasional vomiting (8, 9, 10).

The obligatory item on the differential diagnosis list is atopic dermatitis. It is worth stressing that currently many dogs show hypersensitivity to both environmental allergens and food allergens (12, 13). Therefore, in any dog diagnosed with atopic dermatitis, food allergy has to be confirmed or excluded by an appropriate elimination diet (6, 7). Other items on the differential diagnosis list are diseases accompanied by pruritus scabies, chey - leioiisis, lice, louse, folliculitis (mycosis, demodecosis) and other oversensitivities (contact allergy, flea allergy) (5, 6).

The diagnosis of food allergy is based on history, results of clinical examination and the results of the prior treatment (1, 2, 3).

Intradermal tests and serological tests for food oversensitivity are frequently non -diagnostic and are rarely recommended because of their unreliable results. This is why only the gold standard in food allergy diagnostics is a food test with an elimination diet (6, 10, 11). Such test consists in feeding the animal suspected of a food allergy with new foods, once the animal has not eaten before. The diet of such animal should not contain food previously fed to the animal or treats, leftovers of the owners’ food, flavoured desmovers (and other flavoured snacks), flavoured drinks, food supplements or chewing treats. The most common food allergens in Poland are chicken, beef, eggs, dairy and wheat. The elimination diet can be prepared at home by the owner, but there are also commercially available ready diets with one protein and one carbohydrate source, or diets based on hydrolysed protein. Such diet should be observed for at least eight weeks, or as long as 12 weeks (6, 8, 9, 10).

**The aim of the study**

The aim of the study was to evaluate the efficiency of 4T Veterinary Diet Dermatosis Digestive Support, a diet with salmon as the only protein source as an elimination diet in atopic dermatitis and treatment of dogs with food allergy or intolerance.

**Materials and methods**

12 dogs of different breeds, both sexes (six females, six males), between one and four years of age, with bodyweight from 4 to 38 kg, were qualified for the study. The qualified patients are characterised in Table No. 1. All dogs showed allergy symptoms. The diagnosis was based on history, typical clinical symptoms and exclusion of other skin diseases and their complications. All dogs had allergic reactions against environmental allergens, and the results of the tests were negative. Before the beginning of the study, other skin conditions were excluded (parasitic diseases, mycosis, etc.), complications of food allergy, such as anaphylaxis, were excluded. The study has been treated as well. In the course of the study (eight weeks) the dogs were fed with 4T Veterinary Diet Dermatosis Digestive Support elimination diet only, in doses appropriate for
10 dogs. In the 50th day of the study the only lesions that were found were mild or moderate erythema, in two dogs, moderate erythema and mild excoriation were found. In case of the 10 dogs that reacted well to the diet, the CADESI value on day zero was 81.20, day 14 – 70.12, on day 28 – 52.60; on day 42 – 45.40, and on day 56 – 43.00. It is worth stressing that the differences between day zero and day 42 and between day zero and 56 where statistically significant.

The recommendations of the International Committee on Allergic Diseases of Animals (ICADA) published in 2010 and in every dog with non-seasonal pruritus and/or atopic dermatitis, in order to evaluate which food components might cause the lesions to recur (13).

Table 1. Dogs qualified for the study

<table>
<thead>
<tr>
<th>No.</th>
<th>breed</th>
<th>age</th>
<th>sex</th>
<th>body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>German Shepherd</td>
<td>3</td>
<td>female</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Labrador</td>
<td>2</td>
<td>male</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>Golden retriever</td>
<td>1</td>
<td>female</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>WHWT</td>
<td>3</td>
<td>female</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Labrador</td>
<td>2</td>
<td>male</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>Yorkshire terier</td>
<td>3</td>
<td>male</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>German Shepherd</td>
<td>4</td>
<td>male</td>
<td>34</td>
</tr>
<tr>
<td>8</td>
<td>Yorkshire terier</td>
<td>3</td>
<td>female</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Beagle</td>
<td>2</td>
<td>male</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>Beagle</td>
<td>2</td>
<td>male</td>
<td>16</td>
</tr>
<tr>
<td>11</td>
<td>Shar-pei</td>
<td>3</td>
<td>female</td>
<td>21</td>
</tr>
<tr>
<td>12</td>
<td>WHWT</td>
<td>3</td>
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</table>

Table 2. CADESI values on particular test days (0, 14, 28, 42, 56)

<table>
<thead>
<tr>
<th>No.</th>
<th>breed</th>
<th>D 0</th>
<th>D 14</th>
<th>D 28</th>
<th>D 42</th>
<th>D 56</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ON</td>
<td>131</td>
<td>104</td>
<td>102</td>
<td>68</td>
<td>73</td>
</tr>
<tr>
<td>2</td>
<td>LABR</td>
<td>62</td>
<td>62</td>
<td>41</td>
<td>33</td>
<td>35</td>
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<tr>
<td>3</td>
<td>GR</td>
<td>92</td>
<td>94</td>
<td>95</td>
<td>102</td>
<td>102</td>
</tr>
<tr>
<td>4</td>
<td>WHWT</td>
<td>81</td>
<td>71</td>
<td>60</td>
<td>52</td>
<td>48</td>
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<tr>
<td>5</td>
<td>LABR</td>
<td>153</td>
<td>114</td>
<td>85</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>6</td>
<td>YORK</td>
<td>76</td>
<td>53</td>
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<td>28</td>
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<tr>
<td>7</td>
<td>ON</td>
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<td>105</td>
<td>100</td>
<td>97</td>
<td>94</td>
</tr>
<tr>
<td>8</td>
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<td>18</td>
<td>23</td>
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<tr>
<td>9</td>
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<td>29</td>
<td>29</td>
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<tr>
<td>10</td>
<td>SHARP</td>
<td>77</td>
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<td>51</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>11</td>
<td>WHWT</td>
<td>53</td>
<td>55</td>
<td>30</td>
<td>30</td>
<td>21</td>
</tr>
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</table>

Table 3. Mean value and standard deviation result on particular test days.

<table>
<thead>
<tr>
<th>No.</th>
<th>D 0</th>
<th>D 14</th>
<th>D 28</th>
<th>D 42</th>
<th>D 56</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean value</td>
<td>83.08</td>
<td>75.00</td>
<td>60.08</td>
<td>54.42</td>
<td>49.83</td>
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<tr>
<td>Standard deviation</td>
<td>32.95</td>
<td>25.95</td>
<td>29.38</td>
<td>27.14</td>
<td>24.55</td>
</tr>
<tr>
<td>Error</td>
<td>9.511</td>
<td>7.498</td>
<td>8.480</td>
<td>7.835</td>
<td>7.087</td>
</tr>
</tbody>
</table>

Results of the study

At the beginning of the study (day 0), CADESI in the tested dogs ranged between 37 to 131 (mean value: 83.08). After 14 days, CADESI ranged from 28 to 104 (mean value: 75.00). After four weeks of feeding the dogs with diet (day 28), CADESI ranged from 37 to 102 (mean value: 60.08). On day 42 the index value was from 23 to 102 (mean value: 54.42) and continued to drop to reach values from 21 to 102 (mean value: 49.83) on the last day of the study (day 56). The standard deviation on particular test days was 32.95, 25.95, 29.38, 27.14 and 24.55, respectively. The CADESI values on particular test days are presented in Table 2. Table 3 shows the mean values and standard deviations on particular test days.

Discussion and conclusions.

The present study evaluated the effectiveness of 4T Veterinary Diet Dermatosis Dog in dogs with mild and moderate skin lesions. Dogs with severe lesions resulting from pruritic complications require a topical and systemic treatment. In such cases the treatment limited to diet would not give any clinical results. On day 0 of the study, the CADESI value in the studied dogs ranged from 37 (mild lesions) to 131 (moderate lesions). The maximum number of points that can be reached in CADESI index is 180. The symptoms observed in dogs included in this study were limited to erythema and rubs, without lichenification or alopecia patches in particular body areas.

In 10 dogs the 50th day of the study the only lesions that were found were mild or moderate erythema; in two dogs, moderate erythema and mild excoriation were found. In case of the 10 dogs that reacted well to the diet, the CADESI value on day zero was 81.20, day 14 – 70.12, on day 28 – 52.60; on day 42 – 45.40, and on day 56 – 43.00. It is worth stressing that the differences between day zero and day 42 and between day zero and 56 where statistically significant.

In 10 dogs a purely aetiological diagnosis was made. The most frequently described dermatological symptoms in dogs included a localised, multifocal or generalised pruritus, oitis externa, seborrhoea, superfacial dermatitis and, in some cases, atopic dermatitis. These symptoms can be accompanied by gastrointestinal signs (12). Atopic dermatitis, being also an aetiological diagnosis, might be flared after exposure to environmental allergens and food allergens. ICADA presented an idea that food allergies would suffer from AD. ICADA recommends to run one or more elimination diets in every dog with non-seasonal pruritus and/or atopic dermatitis, in order to evaluate which food components might cause the lesions to recur (13).

Based on the above-mentioned results of the field study on the application of 4T Veterinary Diet Dermatosis Dog, it can be concluded that this diet, with salmon as the only protein source, might be successfully used in diagnosing treatment and prevention of recurrent food allergies and atopic dermatitis in dogs.
The effect of an ear powder on clinical signs in canine with otitis externa.

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email: mikaela@djursjukhusetkarlstad.se

ABSTRACT

Background: Antibiotic resistance is a serious and growing problem, in particular when it comes to pathogenic organisms. One of the most common ailments affecting the canine population is otitis externa and the main bacterium implicated in otitis externa is Staphylococcus Pseudintermedius, which has been shown to be resistant to antibiotics. It has also been reported that Pseudintermedius is zoonotic, which may pose public health concerns. It would therefore be desirable to find a prophylaxis for otitis externa that both the dog and owner find convenient and easy to use. What we want to investigate in this study is if there is way to inhibit the overgrowth of microorganisms without pharmaceutical compounds and by doing so limit the risk of future ear problems.

Objectives: The hypothesis is by administering a powder in canine ears consisting of an organic acid, absorbents of moisture and fat, and specific sugars, clinical signs of otitis externa will decrease. This implicate that there has been an inhibition of microbial overgrowth. Additionally we investigate whether a powder is convenient to use for dogs and their owners.

Methods: 17 privately owned dogs with clear clinical signs of otitis externa of different severity were randomized into two groups and were treated with an ear powder for 14 days. Clinical signs were determined before and after treatment on day one and by two veterinarians.

Results: A significant decrease in overall clinical signs was observed in the study (p<0,05). Out of the 17 dogs participating in the study 76% showed an overall improvement. Foul odor, pruritus, head shaking and excessive accumulation of lipid/wax were significantly reduced (p<0,05). The powder was well tolerated and well accepted by the dogs and their owners. No adverse side effects were observed. All dogs enrolled completed the study.

Results: The use of the powder is a safe and an effective measure to reduce clinical signs of otitis externa. No buildup of powder in the ear canal was reported and all dogs enrolled completed the study. The administration of the powder was well accepted by the dogs and the compliance was 100 percent. This powder may provide an alternative therapeutical and prophylactic approach to lower the risk of overgrowth of microorganisms that can cause ear infection.

INTRODUCTION

Ear problems in dogs are a common ailment that affects an estimated 15-20 percent of total canine population.1 Clinical signs of otitis externa are foul odor, pruritus, head shaking, lipid/wax deposions and erythema. Clinicians must consider the underlying mechanism responsible for otitis externa when examining dogs with ear problems. There are primary causes, predisposing and predisposing factors that will decide the therapy for ear disease.1 Primary causes of otitis externa could be parasites, hyperkeratization, keratinization disorders and autoimmune diseases. These conditions are responsible for altering the environment in the ear canal to allow for abnormal colonization of microorganisms.

Perpetuating factors include bacteria (primarily Staphylococcus spp. and Pseudomonas spp.), yeasts (primarily Malassezia spp.) and pathologic changes, such as glandular hyperplasia, epidermal folds, neoplasia, edema, mineralization, and fibrosis. Predisposing factors are pendulous pinnae, excessive wax production, high humidity, stenosis and hair in the ears. Alterations in normal microflora in the ear and skin may play a role as predisposing factors in allowing the overgrowth of Malassezia organism.2 Malassezia Pachydermatis is a common commensal lipophilic yeast of the anal sacs, anus, auditory canal, and skin of dogs. Malassezia may be found on the skin in as many as 50 percent of healthy dogs and is a common etiologic agent in otitis externa.3 It has been reported that Malassezia Pachydermatis can cause nosocomial infection in humans.12 Factors favoring its growth include abnormal levels of ceruminous lipids, high humidity, and abnormal cell-mediated immunity. Another prereq- uiite for optimal growth is a pH in the range of five to eight with a marginal to null growth around pH 3.4 Staphylococcus Pseudintermedius is a common commensal of oral, nasal, and skin flora in healthy dogs, where it can also cause invasive disease. In humans, it is recognized as an invasive zo-onotic pathogen and has been isolated from 18% of canine-inflicted wounds.5 Pseudintermedius species has been shown to be resistant to antibiotics which is a cause of concern to public health.6 The optimal pH level for growth is between 7 and 7.5. At pH 5 the growth will be inhibited and under pH 4 it will not grow. It has also been reported that Staphylococcus is a biofilm producer at certain pH levels. The capability to produce biofilm is inhibited at pH 3.7 The concerned microorganisms are sensitive to changes in the physical environment in the ear. Moisture, lipid levels and pH changes can significa- ntly change optimal growth conditions and disturb colonization.

Treatment and prophylaxis therapy for otitis externa typically involve careful cleaning of the auditory canal with liquid ear cleaners. By removal of lipid substrates the necessary conditions for growth and reproduction of the organisms are eliminated. There are numerous ear cleaners commercially available containing a variety of ingredients, such as alcohols, organic acids, propylene glycol, various peroxides and detergents all in liquid preparations. However, liquid preparations have some disadvantages as dogs may resist liquids in the ear.

The authors wanted to investigate whether a powder containing lactic acid, kaolin, lactose, L-fucose and HMO (Human Milk Oligosaccharides) could have an effect on clinical signs of otitis externa as well as to evaluate the acceptance by dogs when receiving powder in the ears.

It has been demonstrated in numerous papers that by lowering pH with organic acids the microbial growth will be inhibited. This effect is at its highest when there is a maximum of dissociated acid. The proportion of dissociated and undissociated acid is equal when the pH is equivalent to the pKa.8 L-Fucose and HMO are special sugars that in certain cases can connect to lectins on bacteria and by doing so inhibit the adhesion to cells. It has been shown that Fucose and galactose has an antiadhesive property on P. aeruginosa in humans.9 Further 1, Fucose has shown to have wound healing properties by modification of dermal fibroblasts through collagen biosynthesis.10 HMO may also modulate epithelial and immune cell responses.11 The authors have no intention to show that the application of a powder is a treat- ment in the pharmaceutical sense, rather a prophylaxis for ear infection by controlling the microbial overgrowth.

MATERIALS AND METHODS

The study was designed to make the partic- ipants their own controls. In the design of the study it was decided that swabbing would not be used as the quantification using swabbing may pose difficulties and uncer- tainty when it comes to the evaluation of the results.

Rather a more broad approach was chosen where clinical signs of otitis externa would serve as a sign of microbial over- growth. It was estimated that the application of a powder would serve as a sign of microbial overgrowth.

Table 1.

<table>
<thead>
<tr>
<th>Average change in clinical sign grade for those participants that improve</th>
<th>Średnia zmiana stopnia nasilenia objawów klinicznych u psów, których stan uległ poprawie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor</td>
<td>Nieprzyjemny zapach</td>
</tr>
<tr>
<td>Pruritus</td>
<td>Świad</td>
</tr>
<tr>
<td>Shaking head</td>
<td>Potrząsanie głową</td>
</tr>
<tr>
<td>Erythema</td>
<td>Rumień</td>
</tr>
<tr>
<td>Excessive wax build</td>
<td>Nadmiernie wydzielenie woskowny</td>
</tr>
<tr>
<td>Day 1</td>
<td>Dzień 1</td>
</tr>
<tr>
<td>Day 14</td>
<td>Dzień 14</td>
</tr>
<tr>
<td>Percent of total population that improved</td>
<td>Procent psów, których stan uległ poprawie, w stosunku do badanej populacji</td>
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</table>
Out of the 17 dogs participating in the study signs was observed in the study (p < 0.05).

**STATISTICAL ANALYSIS**
excessive accumulation of lipid/wax and erythema.

To be included in the study the patient had to be exhibiting at least one clinical sign of pruritus, head shaking, foul odor, excessive lipid/wax buildup or erythema. Patients with a more severe manifestation of clinical signs with a grade exceeding 5 of the clinical sign scale were excluded from participating in the study.

After the initial examination the veterinarian showed the participant how to give the powder by administering the first dose. The dose given was adapted to the size of the ear of the specific dog.

The participants were given a canister with a powder and a measuring spoon together with a report card. They were asked to give one dose once per day for the following four days and one dose on day nine and 13. They were also asked to make comments on the report card of their observations from day two to day 13.

On day 14 the participants came back to the clinic and was once again examined by the same veterinarian that did the first examination. The veterinarian them conducted a final grading of the clinical signs.

Twenty privately owned dogs with documented clinical signs for otitis externa was enrolled in the study. The total amount of ears examined was 32. Three participants did not follow the protocol and were therefore excluded from the final report. Of the 17 dogs that completed the study 10 were males and 7 females with an age of 2 to 13 years. Of the 17 dogs 13 had a previous history of ear problems, 10 of them in the last 12 months.

The results below are in the case of odor, excessive accumulation of lipid/wax and erythema based on individual ears (n=32).

**RESULTS**

Two-tailed paired t-test was used to compare results from visit one and two. A level of P < 0.05 was used to indicate a statistically significant difference.

A significant decrease in overall clinical signs was observed in the study (p < 0.05). Out of the 17 dogs participating in the study 76% showed an overall improvement.

Pruritus and Head Shaking were both significantly better (p < 0.05). For 13 dogs out of 17 with pruritus the average clinical sign grade at the initial examination was 2.7 and at the final examination 0.7 and for head shaking it went from 2.7 to 0.4.

Excessive accumulation of lipid/wax was significantly reduced (p < 0.05). The average clinical sign grade for 23 ears of 32 went from an average of 3.0 to 1.3. Foul odor was also significantly reduced in the beginning but all received grade 1 on day 14.

At the same time these 6 ears all had gone from grade 3 in pruritus to grade 0 and from 2, 4 and 3 to 0, 1 in shaking head.

There was no significant change in the clinical signs grades for erythema although 50% of the ears improved. 37% showed a slight worsening. The rest were unchanged.

The powder was well tolerated and no adverse side effects were observed. No obstruction of the powder in the ear canal was reported. The dog owners reported that it was easy and convenient to administer the powder, as the dogs did not resist when giving the daily dose.

**DISCUSSION**

All dogs enrolled completed the study. 20% of the dogs showed no improvement, 20% significantly improved in this study. We can an additive effect on the clinical signs studied.

**PRACTICE FROM SHELF**

Ear canal after OTICURANT application

Dog's ear canal after OTICURANT treatment

**PERCENT OF TOTAL POPULATION THAT**

- **ODOR**
- **PRURITUS**
- **SHAKING HEAD**
- **ERYTHEMA**
- **EXCESSIVE WAX BUILD UP**

**PERCENT OF TOTAL THAT IMPROVED**

- **ODOR**
- **PRURITUS**
- **SHAKING HEAD**
- **ERYTHEMA**
- **EXCESSIVE WAX BUILD UP**

**LACTIC ACID**

Lactic acid is natural organic acid that has a quick onset as it dissolves rapidly in water. The pH for the powder dissolved in water is just below 4, which is equivalent to lactic acids pKa of 3.86. This will give the maximum inhibitory effect on microorganisms. Lactic acid is highly hygroscopic as well, giving an additive effect to lactose and kaolin that are the two main absorbents of moisture and lipids in the formulation.

**KAOLIN AND LACTOSE**

Some lipid dependent Malassezia species have been isolated in canine ears but the most common yeast is M Pachydermatis. For this yeast lipids is not essential for growth although needed for a rapid growth. Kaolin and Lactose are two effective absorbent of lipids and moisture keeping available lipids at a minimum. Both ingredients are highly hygroscopic substances that dry out the hummid ear canal removing the moisture necessary for Malassezia to function.

**L-FUCOSE AND HMO**

The scope of the study was to evaluate clinical signs not separate ingredients. Having said that, based on the literature it could be of interest to conduct further studies with the objective to evaluate these sugars role in inhibiting microbial growth.

**EXCESSIVE LIPID/WAX DEPOSITS**

A surprise finding in the study was the significant lowering of excessive lipid/wax deposits. During the study period the ears of dogs were not allowed to clean themselves by the ears of their dogs. When considering that a powder was poured into the ear it may be expected that excess powder would accumulate in the ear. This was not the case in this study.

Actually the opposite was true as ears were significant cleaner (p < 0.05) at the end of the study than on day one.

It was considered whether Epithelial Migration (EM) could be the answer to the significant result. EM is the self-cleaning mechanism of the ear canal as well as the tympanic membrane. Although difficult to measure, several studies have tried to evaluate the EM rate. One study report EM rates on the tympanic membrane between 96.4 (±43.1) µm/day and 225.4 (±128.1) µm/day in healthy dogs. There are other studies reporting similar results. In this study the participants all showed clinical signs of otitis externa. It has been speculated that otitis externa may obstruct the EM rate. Considering that this study only lasted 14 days the EM does not explain why the study population had significant cleaner ears.

**PHYSICAL ACTION**

Once the ingredients in the powder come in contact with a moist surface it will directly dissolve and cling to the powder. When the powder has saturated the surface the rest of the powder will be free flowing

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The correct appearance of the ear canal after OTICURANT treatment.

**PRACTICE FROM SHELF**

The above-mentioned lesions usually occur in places prone to injuries, such as skin-membrane connections, diastal parts of the body and fingers. Fur becomes dull, and bacterial and fungal infections occur. However, diet-related zinc deficiency is infrequent (7). Biotin (vitamin H and B7) is a co-enzyme of a few various enzymes. It is an essential component of biotin-dependent carboxylases. Carboxylases are enzymes which are vital for many important biochemical reactions, for example in the process of the formation of glucose (gluconeogenesis), the synthesis of fatty acids or the cycle of citric acid. Biotin supports the normal functions of the thyroid gland and contributes to the normal functioning of the skin and hair. Symptoms of biotin deficiency include dermatitis, urticarial and hair-loss. Other systemic manifestations may include an elevated level of cholesterol and inflammatory lesions in the bowels. As biotin can be synthetized by the intestinal flora, deficiency occurs very rarely and is usually caused by other than nutritional factors. Biotin deficiency happens during a prolonged antibiotic therapy which is often prescribed in the treatment of post-atopic dermatitis bacterial infections (pseudomembrane). Essential unsaturated fatty acids (n-3 and n-6) have been widely used in the treatment of atopic dermatis for more than 25 years. Their clinical significance has so far been proved in about twenty studies (1-3). Currently, essential unsaturated fatty acids are widely used in the treatment of atopic dermatitis in dogs (7,9). They inhibit the synthesis of LTB4 by re-balancing the hydrophilic barrier on the whole surface of the dog’s skin. Polyunsaturated fatty acids are components of cell membranes; their oxidation contributes to the formation of prostaglandins and leukotrienes, two eicosanoids which take part in the development of inflammatory conditions. Both the eicosapentanoic and gamma-linolenic acids (omega-3 and omega-6 respectively) participate in the metabolism of arachidonic acid by competing with the same enzymes, and thus reduce the production of inflammatory eicosanoids (e.g. PG E2, PG I2, LT B4). This, in turn, favours the production of anti-inflammatory eicosanoids such as PG E1, PG E3 or LT B5. Eicosapentanoic acid can be found in oil obtained from some fish and the highest concentration of gamma-linolenic acid is in oils from evening primrose and borage (4,5,7).

**CONCLUSION**

The use of the powder is a safe and an effective measure to reduce clinical signs of otitis externa. The powder was well tolerated and no adverse side effects were observed. No buildup of powder in the ear canal was reported and all dogs enrolled completed the study. The administration of the powder was well accepted by the dogs and the compliance was 100 percent. This powder may provide an alternative therapeutic and prophylactic approach to lower the risk of microbial overgrowth that can cause ear infection.

**ACKNOWLEDGEMENT**

The author likes to thank all colleagues that participated in the study along with Omundes A.B., Stockholm, Sweden that supplied the powder for the study.

**REFERENCES**


8. Essential unsaturated fatty acids (n-3 and n-6) have been widely used in the treatment of atopic dermatitis for more than 25 years. Their clinical significance has so far been proved in about twenty studies (1-3). Currently, essential unsaturated fatty acids are widely used in the treatment of atopic dermatitis in dogs (7,9). They inhibit the synthesis of LTB4 by re-balancing the hydrophilic barrier on the whole surface of the dog’s skin. Polyunsaturated fatty acids are components of cell membranes; their oxidation contributes to the formation of prostaglandins and leukotrienes, two eicosanoids which take part in the development of inflammatory conditions. Both the eicosapentanoic and gamma-linolenic acids (omega-3 and omega-6 respectively) participate in the metabolism of arachidonic acid by competing with the same enzymes, and thus reduce the production of inflammatory eicosanoids (e.g. PG E2, PG I2, LT B4). This, in turn, favours the production of anti-inflammatory eicosanoids such as PG E1, PG E3 or LT B5. Eicosapentanoic acid can be found in oil obtained from some fish and the highest concentration of gamma-linolenic acid is in oils from evening primrose and borage (4,5,7).

9. Preparation containing essential unsaturated fatty acids combined with other substances, such as vitamins, minerals or other factors have been a relatively new area and further experiments are needed to evaluate their effectiveness. Many producers believe that the right combination of a few substances will maximize their efficiency (7). So far, however, there are no studies concerning those types of products. So far, no studies which would confirm the efficiency have been presented. In one study involving a double-blind trial the product containing polyunsaturated fatty acids and co-factor proved less effective than a product without co-factor (10). However, further research is needed.

10. The analysed Vetoskin preparation contains omega-3 and omega-6 acids as well as B vitamins, biotin and zinc. B vitamins are constantly synthetized by the intestinal flora but are they are water-soluble they are not stored in the body. Therefore, they have to be continuously supplied. Deficiency in group B vitamins may lead to skin conditions. Such conditions, however, are not very specific and other diseases should be taken into consider- ration in the process of differential diagnosis. Clinical symptoms of a B group vitamin deficiency include dull hair, dry seborrhea and hair-loss on some facial areas. Vitamin B (pyridoxin) takes part in the metabolism of many nutrients related to the normal functioning of hair and skin, such as the formation of liminoids and acidocagoidic acid. Biotin can be synthetized by the intestinal flora, deficiency occurs very rarely and is usually caused by other than nutritional factors. Biotin deficiency happens during a prolonged antibiotic therapy which is often prescribed in the treatment of post-atopic dermatitis bacterial infections (pseudomembrane). Essential unsaturated fatty acids (n-3 and n-6) have been widely used in the treatment of atopic dermatitis for more than 25 years. Their clinical significance has so far been proved in about twenty studies (1-3). Currently, essential unsaturated fatty acids are widely used in the treatment of atopic dermatitis in dogs (7,9). They inhibit the synthesis of LTB4 by re-balancing the hydrophilic barrier on the whole surface of the dog’s skin. Polyunsaturated fatty acids are components of cell membranes; their oxidation contributes to the formation of prostaglandins and leukotrienes, two eicosanoids which take part in the development of inflammatory conditions. Both the eicosapentanoic and gamma-linolenic acids (omega-3 and omega-6 respectively) participate in the metabolism of arachidonic acid by competing with the same enzymes, and thus reduce the production of inflammatory eicosanoids (e.g. PG E2, PG I2, LT B4). This, in turn, favours the production of anti-inflammatory eicosanoids such as PG E1, PG E3 or LT B5. Eicosapentanoic acid can be found in oil obtained from some fish and the highest concentration of gamma-linolenic acid is in oils from evening primrose and borage (4,5,7).


Tab. 1. Median absolute deviations (95% of confidence intervals) for the value of the parameter in both groups in successive time points.

<table>
<thead>
<tr>
<th>Group</th>
<th>Day 0</th>
<th>Day 30</th>
<th>Day 60</th>
<th>Day 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study (n = 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (n = 10)</td>
<td>66 ± 2.6</td>
<td>71.6 ± 3.4</td>
<td>80.0 ± 3.7</td>
<td>100.0 ± 3.6 (95% CI: 37,2-48,0)</td>
</tr>
<tr>
<td>F-value (in the Tukey’s test)</td>
<td>0.994</td>
<td>0.999</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**PRACTICE FROM SHELF**

The correct appearance of the ear canal after OTICURANT treatment.

**PRACTICE FROM SHELF**

The correct appearance of the ear canal after OTICURANT treatment.

**PRACTICE FROM SHELF**

The correct appearance of the ear canal after OTICURANT treatment.
Positive results in all cases. The intradermic Pid diagnostic tests to assess the total number of IgE antibodies (VetExpert). The tests gave positive results in all cases. The intradermic tests were conducted at least 3 months before the animals were qualified for the study. All the dogs were found sensitive to many allergens. Dogs with seasonal allergies were not included in the study.

In all dogs from both groups the symptoms of atopic dermatitis of varied intensity had been present for the whole year. The study group consisted of dogs aged 2-6 years (the average of 4.2 years), 10 females, including 4 spayed and 6 neutered, including 5 castrated ones. The dogs represented different breeds, 5 Labradors, 5 mongrels, 3 West-highland white terriers, 2 Maltese dogs, 3 German shepherds and 1 Dachshund and their body weight ranged from 10 to 30 kg. The control group consisted of 10 dogs aged 3-6 years (the average of 5 years), 5 females, including 4 spayed and 6 neutered, including 5 castrated ones. The dogs represented different breeds, 2 Labradors, 3 mongrels, 2 West-highland white terriers and 3 German shepherds of body weight ranging from 10 to 40 kg. Food allergies were excluded in all dogs by using hydrolyzed elimination diet for at least 12 weeks. Throughout the study the dogs were fed biconditional diets, the following the same diet (Hypoallergenic’Royal Canin). The dogs did not undergo allergen immunotherapies. During the three-year study the dogs did not receive anti-inflammatory drugs, glucocorticoids, antibiotics, immunosuppressants or cytostatics.

Animals from the study group received VetoSkin® containing B-group vitamins (B1, B2, B6 and B12), NNKT-Omega-3/Omega-6, biotin and ascorbic acid (VetExpert). The dogs were administered the content. Dogs from the control group did not receive VetoSkin®.

All dogs underwent dermatological examinations four times on the following days: 0, 30th, 60th and 90th. The intensification of lesions was assessed by using the CADESI 03 system. The levels of erythema, lichen, skin abrasion and hair loss caused by self-mutilation in 62 areas of the body were analyzed. The scoring point-scale was used to assess the lesions: 0 – lesions free, 1 – mild lesions, 2, 3 – moderate lesions and 4, 5 – considerable lesions. All dogs were in remission from allergic lesions on the day 0 of the study.

Statistically significant differences were observed for inter-group comparison (p<0,001), inter-time points comparison (p<0,001) and for the interaction of group and time (p<0,001). The value of the measured parameter changed over time in both groups and the direction of those changes was divergent.

In the study group the CADESI value remained the same between day 0 and 30 (p=0,248) but was statistically significantly lower between the 30th and 60th days (p<0,001) and remained constant between the 60th and 90th days (p=0,988). Statistically significant decrease in the CADESI value compared with day 0, and on the 90th day it was significantly higher (p<0,001) on the 30th, 60th and even on the 60th day (p<0,001). The CADESI value was different between the study and control groups occurred on the 60th (p=0,009) and 90th days (p=0,009) and the statistically significant difference between the groups on days 0 (p=0,994) and 30 (p=0,999). It is good because this means that the VetoSkin® was comparable at the very beginning of the study.

Results of the study and discussion

At the beginning of the study in dogs from both groups mild to moderate symptoms of atopic dermatitis were observed. The levels of erythema, lichen, skin abrasion and hair-loss caused by self-mutilation in 62 areas of the body were analyzed. The scoring point-scale was used to assess the lesions: 0 – lesions free, 1 – mild lesions, 2, 3 – moderate lesions and 4, 5 – considerable lesions. All dogs were in remission from allergic lesions on the day 0 of the study.

The intensity of pruritus according to PAVAS (Pruritus Visual Analog Scale) was assessed four times. On day 0 in 9 dogs from the study group (45%) mild pruritus was observed, in 8 dogs (40%) and 8 from the control group (40%) moderate and was in 3 dogs (15%) on the 30th day of the study group. On day 0 mild pruritus was observed in 4 dogs (40%), mild to moderate in 3 dogs (30%) and in 2 dogs (20%) it was mild. On the 30th day of the study in 7 dogs from group I (35%) mild pruritus was observed, in 9 dogs (45%) in group II it was mild to moderate and in 4 dogs (20%) it was mild to moderate. In group II mild to moderate pruritus was reported in 7 dogs (70%) and in the case of 9 dogs (90%) the intensity of pruritus was mild to moderate in 4 dogs (20%) and in 3 dogs (30%) it was mild to moderate. In group II mild to moderate pruritus was reported in 7 dogs (70%) and in the case of 9 dogs (90%) the intensity of pruritus was mild to moderate in 4 dogs (20%) and in 3 dogs (30%) it was mild to moderate. In group II mild to moderate pruritus was reported in 7 dogs (70%) and in the case of 9 dogs (90%) the intensity of pruritus was mild to moderate in 4 dogs (20%) and in 3 dogs (30%) it was mild to moderate.

Similar results were obtained in earlier conducted studies (1,2,3,7). In one of the studies it was observed that in young dogs with recently developed atopic dermatitis the response of the body was significantly reduced after two months. In this study the improvement was observed in both younger (23 years) and older (5 years) dogs. A study concerning the intensity of pruritus according to PAVAS (Pruritus Visual Analog Scale) was considerable reduction in the intensity of pruritus was observed in the study group after 60 and 90 days. In the dogs from control group the intensity of pruritus increased gradually over time and was followed by complications such as pellagone, which required a treatment with glucocorticoids.

Intradermal skin tests carried out in a dog qualified for the study.

Intradermal skin tests carried out in a dog qualified for the study.

Small erythema on the abdominal area of a WH-WT with mild atopic dermatitis.

As a result of the study done after the cat’s diet, no side effects were observed in the available literature, including diarrhea and pancreatitis were noticed (7). The results obtained in the present study indicate that VetoSkin® containing polysaturated fatty acids, B-group vitamins, zinc and biotin may be used in dogs with atopic dermatitis to alleviate the dermatological symptoms and the intensity of pruritus.

**Literature:**

Otitis externa: VetExpert’s approach

Natalia Jackowska, DVM

Inflammation of the external auditory canal is one of the most frequent complaints that bring dog owners to veterinary clinics. Recurrent infections and repeated visits can cause frustration in both owners and doctors. Staphylococcal or fungal infections are typical complications of the primary disease (such as atopy, polyps, or neoplastic processes), and a protracted inflammation and inappropriate treatment of the external auditory canal may result in infections with Gram-negative bacteria (bacilli). The frequent failure of treatment in otitis externa raises an important question: are medications (antibiotics and anti-fungal agents) necessary in the first place? An attempt to eliminate just the secondary disease (otitis externa) often ends in failure. It is crucial to determine the primary cause and adopt the correct course of action. Bilateral otitis is often observed in atopic dermatitis, and, as has been shown, treating the ears alone fails to address the root cause of the problem. Antibiotics and anti-fungal drugs will not help eliminate the disease, and may cause a series of additional problems, such as increased bacterial resistance and bacilli infections. To address the issue of bacterial resistance and recurrent otitis, VetExpert proposes an alternative solution.

Oticurant
Oticurant is an absorbent powder that soaks up moisture and lipids, reducing the pH below 4, which impedes the growth of microorganisms. At the pH of 5, the proliferation of Staphylococcus pseudintermedius is significantly slowed down, and at the pH of 4, it stops completely. A powder formula facilitates the application of the product. Another frequent commensal of the auditory canal is Malassezia pachydermatis, whose proliferation is promoted by an excess of sebum, high moisture, and an abnormal immunological response of the cellular type. A necessary condition for the proliferation of yeast is the pH of about 5-9; at the pH of 3, on the other hand, the growth is minimal or shuts down completely. Oticurant is ideal for dogs suffering from pain and swelling in the auditory canal. Easy application without the need to massage the base of the ear allows to control the disease even in pets usually qualified for sedation. Oticurant has many advantages and can be used in most cases of otitis externa; it should be kept in mind, however, that when Gram-negative bacteria are involved, a large pH drop may contribute to infections. Prior cytology will be necessary to choose the appropriate course of treatment.

Otitlush
Otitlush is a hygiene product designed for rinsing the auditory canals. An optimum pH of 5 makes it suitable for use regardless of the root cause (fungal or bacterial) of otitis externa. The main ingredient of the product, chlorhexidine, has strong antibacterial and antifungal properties, and thanks to its safe concentration, Otitlush has no oto-toxic side-effects. Tris-EDTA increases the permeability of cell membranes in bacteria, showing a strong bactericidal effect also on Pseudomonas aeruginosa, and the chelation of metal ions necessary to ensure the integrity of cell walls counteracts sores and tissue necrosis caused by infections with this strain of bacteria. Otitlush can be used to rinse auditory canals in inflammations accompanied by excessive exudate, regardless of their underlying cause, in monotherapy or in order to prepare the auditory canal for treatment.

Othielp
An emulsion for the daily hygiene of auditory canals. An optimum pH of 5 and the presence of chlorhexidine and Tris-EDTA ensure a strong antibacterial and antifungal effect. It should be kept in mind that recurrent inflammations of the auditory canal are caused by an underlying primary disease. Othielp is ideal for maintaining and restoring the normal function of auditory canals without the risk of increasing the antibiotic resistance of the overgrown bacterial and/or fungal flora.

The key to success in the treatment of otitis externa is choosing the correct approach. Keeping the inflammation down to a manageable level helps ensure the good mood of both the pet and the owner. The line of VetExpert products makes it possible to select the appropriate treatment algorithm and guarantees that the therapy is safe and effective.

Table 1.

<table>
<thead>
<tr>
<th>Cytology result</th>
<th>VetExpert product</th>
<th>Proposed treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocci</td>
<td>Othielp Otitflush Oticurant</td>
<td>Rinse the auditory canal with Otitflush; for daily hygiene, apply Othielp for a minimum of 7 days or according to your doctor’s recommendations. Oticurant can be used in monotherapy or after the prior rinsing of the auditory canal with Otitflush.</td>
</tr>
<tr>
<td>Malassezia</td>
<td>Othielp Otitflush Oticurant</td>
<td></td>
</tr>
<tr>
<td>Gram-negative bacilli</td>
<td>Othielp Otitflush</td>
<td>The presence of Gram-negative bacilli in cytology is a serious complication of otitis externa and involves a high risk of increased antibiotic resistance. Rinse the auditory canal with Otitflush and continue using Othielp daily until you receive a negative swab test result. It is extremely important to eliminate the primary disease.</td>
</tr>
</tbody>
</table>
VetExpert Oticurant

Oticurant® is an ear care product that supports physiological ear conditions and helps to restore balance by binding moisture and wax and preventing overgrowth of fungi and bacteria. It contains chlorhexidine which exerts antibacterial and antifungal activity. OtitFlush could be used in all cases of otitis externa despite its cause (fungal, bacterial). OtitFlush should be used for at least 2 months or until the optimum result is achieved. The dosage is practical and user-friendly. It ensures the durability and quality of easily oxidizing emulsions. The recommended period of administration is one or two times the duration of the disease.

Ingredients:
- Water, sodium salicylate 0.3%, salicylic acid 0.3%, sodium laurate 0.8%, sodium salicylate 3%, sodium lactate 0.4%, chlorhexidine digluconate 0.1%, sodium metabisulfite 0.05%, moisture 1.06%.

Storage conditions:
- Store in a dry place at room temperature. Protect from direct sunlight.

Usage:
- Small amount of fluid should be administered into external ear canal. Careful massage of ear base after administration is recommended. Excessive amount of the fluid should be removed using cotton pledget.

OtitFlush

OtitFlush is a 2% solution of chlorhexidine digluconate. It contains chlorhexidine digluconate 0.2% in a medical-grade ethyl alcohol 96% solution. It exerts antibacterial and antifungal activity. OtitFlush is ideal for flushing of ear canal during inflammation both as a sole product or for cleaning purposes.

Dosage:
- 1 tablespoon for dogs 10 kg body weight.
- 3 tablespoons for cats 5 kg body weight.
- 1 teaspoon for dogs 5 kg body weight.
- 3 teaspoons for cats 2.5 kg body weight.

Ingredients:
- Chlorhexidine digluconate 2%, ethyl alcohol 96% (v/v), propylene glycol 0.5%.

Storage conditions:
- Store in a place out of reach and sight of children and animals.

Usage:
- Small amount of fluid should be administered into external ear canal. Careful massage of ear base after administration is recommended. Excessive amount of the fluid should be removed using cotton pledget.

VetoSkin

VetoSkin is a 2% solution of salicylic acid. It is used for flushing of ear canal during inflammation both as a sole product or for cleaning purposes.

Dosage:
- 1 tablespoon for dogs 10 kg body weight.
- 3 tablespoons for cats 5 kg body weight.
- 1 teaspoon for dogs 5 kg body weight.
- 3 teaspoons for cats 2.5 kg body weight.

Ingredients:
- Salicylic acid 2%, ethyl alcohol 96% (v/v), propylene glycol 0.5%.

Usage:
- Small amount of fluid should be administered into external ear canal. Careful massage of ear base after administration is recommended. Excessive amount of the fluid should be removed using cotton pledget.

Othep

Othep is an solution for dogs and cats.

Optimal results can be achieved in patients with otitis externa and eucretal infection developed as a result of a primary infection in the mucous membrane of the ear. Othep is indicated in the treatment of otitis externa associated with eucretal infections developed as a result of a primary infection in the mucous membrane of the ear.

Usage:
- Usual small amount of fluid should be administered into external ear canal.

Ingredients:
- Sodium salicylate 0.3%, salicylic acid 0.3%, sodium laurate 0.8%, sodium salicylate 3%, sodium lactate 0.4%, chlorhexidine digluconate 0.1%.

Usage:
- Usual small amount of fluid should be administered into external ear canal.

savvy

4t Veterinary Diet Dermatosis Dog

It contains chlorhexidine digluconate that can be used to control infection and support of fungal microorganisms. It can be used in the treatment of dermatosis and other skin disorders, with symptoms including dry, dull and falling out fur and peeling skin. It contains a high level of essential fatty acids and specially selected ingredients to meet the nutritional requirements of dog. The initial amounts are shown in the table on the back of the package.

Dosage:
- Recommended period of administration in case of reducing the occurrence of feed disorders, with symptoms such as dry, dull and falling out fur and peeling skin.

Ingredients:
- Rice, sugar beet, fish meal, yeast, hydrolysate salmon (5%), fish oil, inulin, allantoin, urea, chlorhexidine digluconate, salicylic acid, xanthan gum, menthol, citric acid.

Usage:
- Recommended period of administration is 2 months or until the optimum result is achieved. The capsule may be administered as a whole or cut and mixed with food.

Storage conditions:
- Store in a dry place at room temperature. Protect from direct sunlight.

Information and contacts:
- g.tecz@vp.pl
tel. 607 054 045
Do not hide problems!

VetExpert found complex solution

Ear

Hair:

Skin:

Test:

Diet:

- Otiflush
- Otihelp
- Oticurant

- Benzoic Shampoo
- Specialist Shampoo
- Hypoallergenic Shampoo
- Antiseborrhic Shampoo
- Beauty & Care Shampoo
- Puppy Shampoo

- Vetoskin
- Total IgE Ab

- 4T Vetinary Diet
  Dermatosis salmon & Rice
- 4T Veterinary Diet
  Rabbit & Potato