Canine and Human Atopic Dermatitis: Similarities and Differences¹

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Abstract – Canine atopic dermatitis is a very frequent and sometimes very severe disease. This severity impairs the quality of life of the affected patients but also of their owners. The disease is recognized in all breeds and, in some of them, affects up to 50% of the individuals. CAD is characterized by itch and skin redness occurring mainly on the face and feet. The disease is similar to the counterpart in humans and differences between the two conditions are minor.

Keywords – canine, dog, atopic dermatitis, human

1. Characteristics of canine atopic dermatitis

Canine atopic dermatitis (CAD) is recognized since several decades but the diagnosis became more frequent in the early 1980’s (Hillier and Griffin 2001). Atopic dermatitis (AD) is a disease characterized by itch and redness of the skin occurring mainly on the face, feet and ventral aspects of the body. The first signs occur early in life and up to 75 per cent of affected dogs present the first signs before the third year of life (Favrot, Steffan et al. 2010). Atopic dogs often develop secondary bacterial or yeasts infections, leading to alopecia ³, crusts and lichenification³. The great majority of atopic dogs have elevated allergen-specific immunoglobuline E (IgE) to environmental allergens such as house dust and forage mites, pollens or molds. Some cases of intrinsic AD have however been diagnosed and other allergens such as food or microbes may also induce flares of AD (Halliwell 2006; Olivry, Deboer et al. 2007).

2. Diagnosis and treatment of canine atopic dermatitis

The diagnosis is based on the exclusion of resembling diseases such as ectoparasites⁴, bacterial and fungal infections and the fulfillment of clinical criteria (Favrot, Steffan et al. 2010). Allergy tests are only made when desensitization is considered as a possible treatment option. It is worth mentioning that about 60 to 70 per cent of the desensitized atopic dogs are improved after several months of immunotherapy treatment (Griffin and Hillier 2001). The other treatment options include topical or systemic glucocorticoids or calcineurin-inhibitors such as cyclosporine or tacrolimus.

3. Causes of canine atopic dermatitis

The great familial and breed predisposition and the early onset of the disease may likely be explained by the involvement of genetic factors. Several genetic studies have been carried out but a single one demonstrated a strong association of the disease with a mutated gene, plakophyllin, in one specific breed: German shepherd dogs (Tengvall, Kierczak et al. 2013). Environmental factors have also been studied and these works suggested that the urban way of life is associated with an increased risk of developing the disease (Meury, Molitor et al. 2011)

4. Pathogenesis of canine atopic dermatitis

The current view of the pathogenesis of CAD is that some genetic mutations are associated with impaired epidermal barrier and/or inadequate immune response leading in turn to the development of allergen specific IgE, chronic pruritus⁵ and production of pro-allergic and pro-

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²Alopecia is a condition in which hair is lost from some or all areas of the body.

³Lichenification refers to the process by which skin becomes hardened and leathery or lichenoid usually as a result of chronic irritation

⁴Parasites that live on the surface of the host are called ectoparasites (e.g. some mites).

⁵Pruritus (itch) is a sensation that causes the desire or reflex to scratch

⁶Cytokines are a diverse group of soluble proteins, peptides, or glycoproteins which act as hormonal regulators or signaling molecules at nano- to picomolar concentrations and help in cell signaling.
inflammatory cytokines, attraction of pro-inflammatory cells such as mast cells, eosinophils, neutrophils and, finally, to further epidermal injuries (Nuttall 1998; Marsella, Sousa et al. 2012). On the immunological point of view, CAD is a Th2 disorder in the acute stage of the disease and a Th1 disorder in the more chronic one (Nuttall, Uri et al. 2013).

5. Canine and Human atopic dermatitis: similarities and differences

Based on these observations, it is currently admitted that CAD is the exact counterpart of human AD (Marsella and Girolomoni 2009). The great majority of the changes and features mentioned above may also be recognized in the human atopic patients. Some rare differences have however been noticed. In example, CAD is rarely associated with other signs of hypersensitivity such as allergic conjunctivitis/rhinitis or asthma. As well, CAD rarely fades out in older individuals. Nevertheless, CAD and human AD are very similar diseases and the dog could be considered an excellent model for studies on human AD.

References


Citation


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¹Eosinophiles are white blood cells and one of the immune system components responsible for combating multicellular parasites and certain infections in vertebrates.

²Neutrophils are the most abundant (40 to 75%) type of white blood cells in mammals and form an essential part of the innate immune system.

³Th2 disorders are characterized by the proliferation of one specific subset of helper T lymphocytes (the so called Th2 Lymphocytes) and the production of the corresponding cytokines

⁴Th1 disorders are characterized by the proliferation of one specific subset of helper T lymphocytes (the so called Th1 Lymphocytes) and the production of the corresponding cytokines