

# RNA sequencing reveals novel differentially expressed genes in the skin of atopic and healthy Staffordshire bull terriers

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## 1 Introduction

Analysis of differentially expressed genes (DEGs) in the skin of atopic dogs provides an important approach to increase the understanding of etiopathogenesis in canine atopic dermatitis (AD). The diet is also known to have an impact on the disease and immune function<sup>1</sup>. For the first time, transcriptome RNA sequencing (RNA-Seq) was performed to study difference in the gene expression profiles in the skin of Staffordshire bull terriers (SBTs). The aim of this study was to find genes differentially expressed in the skin of atopic and healthy SBTs using RNA-Seq, with and without the consideration of the diet.

## 2 Material & Methods

A total of 8 client-owned SBTs (4 diagnosed with canine AD and 4 healthy dogs) were included in the analyses. Two AD and two healthy dogs were on a raw food diet, and two AD and two healthy dogs were on a dry food diet, for a median of 140 days. Nonlesional skin biopsies were taken from the axillary area under anesthesia using 8 mm biopsy punches. RNA-Seq was performed using Illumina HiSeq 2500. The differential expression analysis was done with EdgeR and DeSeq2 algorithms, using only data that had a FC  $\geq 2$ , and a FDR  $\leq 0.05$ .

Differentially expressed genes also underwent functional analyses by Ingenuity Pathway Analysis Software (IPA).



## 3 Results

Altogether 149 DEGs were found in AD dogs compared to healthy dogs. Top canonical pathways (TCP) in the AD dogs were angiotensin and epidermal growth factor signaling. When the diet was considered, 856 and 60 DEGs between AD and healthy dogs were found in the dry and raw diet groups, respectively. In the dry diet fed AD dogs the atherosclerosis signaling was the TCP. In the raw diet fed AD dogs the TCP was  $\gamma$ -linolate biosynthesis II.

## 4 Discussion

This study reports novel genes and pathways involved in canine AD. There seems to be increased angiogenesis, wound healing process, and cell proliferation in the skin of AD dogs. Dogs eating a dry diet showed a highly changed regulation of genes, so the diet also seems to have an impact to skin gene expression, which should be taken into account in future studies.

Most upregulated and most downregulated genes in atopic (AD) dogs compared to healthy dogs using all dogs (n=8) in the left, dry food fed dogs (n=4) in the middle and raw food fed dogs (n=4) in the right. Genes in common in all dogs and dry food fed dogs are marked in red and genes in common in all dogs and raw food fed dogs are marked in green.

