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# Could imbalances in the composition of gut microbiota be implicated in the origin of atopic dermatitis?

Atopic dermatitis (AD) is one of the most common chronic inflammatory skin diseases with a worldwide prevalence of approximately 20% in children[1]. Studies on genetic predisposition to eczema have implicated eczema-related genes; environmental factors have also been shown to contribute to the disease pathogenesis[2]. In recent years, there has been increased interest in the role of intestinal microbiota in the etiopathogenesis of AD, because the immune mechanisms involved in AD are complex and little is known about the role of this microbiota[1].

Research shows that gut microbiota is a key source of immune development and regulation early in life[3]. In recent decades, some studies have shown that a possible imbalance in the composition of gut microbiota or the relationship of the microbiota with the host may be implicated in the origin of allergic diseases[4]. Industrialisation has brought about improvements in lifestyle but has also produced an impact on the intestinal microbiota that is difficult to assess. Healthy intestinal microbiota usually comes from the maternal microbiota evidenced because identical strains are shared. A Dutch group[5] has reviewed this transmission of microorganisms from mother to child that can be altered by changes in the maternal microbiota due to diet, health status, exposure to broad-spectrum antibiotics and the mother's genotype. The changes can also be due to a reduction of maternal contact by birth, by caesarean section and the use of artificial lactation. In support of this line of work, Penders et al.[3] showed in their study that birth order had a strong effect on the microbiota composition, with increasing number of older siblings, the colonisation rates of lactobacilli ($P < 0.001$) and bacteroides (P 0.02) at age five weeks increased, whereas rates of clostridia decreased.

In the present issue of Allergologia et Immunopathologia, Melli et al[6] present a cross-sectional study about the profile of the gut microbiota in school-age children living in the city of Osasco, in the Metropolitan Region of Sao Paulo, Brazil. They included 81 children: 23 with AD and 58 controls. The analysis showed that a higher prevalence of clostridium difficile, a greater abundance of Bifidobacterium spp and a lower abundance of lactobacillus spp. in the gut microbiota are associated with AD in school-age children. Those results are similar to other studies[7]. Those authors also found that children with AD presented lower total eubacteria count, and a statistically significant difference between groups for the counts of lactobacillus spp, escherichia coli, bacterioides fragilis and methanobrevicaber smithii. Numerous studies in recent years have indeed shown that the microbiota of infants with allergies differs from the microbiota of infants without allergies[3].

Some authors speak of the skin-gut axis[8], referring to changes in the composition and microbial function, called dysbiosis, both in the intestine and in the skin, related to deviations in immune responses that lead to skin diseases such as atopic dermatitis. In a recent and interesting review on the role of Gut Microbiota in Atopic Dermatitis, Petersen et al.[1] summarised that the results were conflicting and the role of the gut microbiota in the development and severity of AD remains unclear. They included 44 studies: 26 were observational and 18 were interventional (use of probiotics) studies. Some studies showed that participants who developed AD had a less diverse gut microbiome than healthy individuals, while others found no significant differences. In addition, observational studies failed to demonstrate overgrowth or lack of specific bacterial species in patients with AD compared with individuals without AD. Nearly half of the interventional studies showed a positive effect of probiotics on the severity of AD, with a concomitant alteration in the gut microbial composition. The remaining studies showed no effect of probiotics on the severity of AD[1].

In conclusion, our understanding on healthy intestinal microbiota and how it is altered in AD is increasing steadily. However, further research would be necessary to know the mechanisms by which intestinal microbes interfere with the immune system and then incorporate this knowledge into therapy. Although there is currently little evidence that probiotics prevent or treat AD, this may become an alternative in the future. We expect many key findings to be made in the next few years.

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