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The Potential Effect of Respiratory Tract *Microbiota* against Asthma and Allergy

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Introduction

We have an important and neglected symbiotic, our microbiota, that has important effects on our life. For example it has been shown that gut microbiota plays an important role in regulation of the immune system. The implication of gut microbiota in chronic immune-mediated diseases including diabetes [1], multiple sclerosis [2], asthma and allergy [3] has been shown before. A notable increase in the incidence and prevalence of autoimmune and inflammatory disorders is considered as an important consequence of reduced exposure to immunomodulatory effects of gut microbiota and the reduction in amounts and biodiversity of intestinal protozoan, helminth and bacteria because of the changes in life style, nutritional habits and antibiotic usage; has been recently reported all over the world [4].

Candela et al. [5] showed a significant decrease in members of some bacterial species in stool samples including *Akkermansia muciniphila, Faecalibacterium prausnitzii* and *Clostridium leptum* in children with allergy. Other studies found a reverse correlation between these bacteria and other inflammatory disorders. Tanaka & Nakayama [6] have provided a review about the development of the gut microbiota in infancy and its impact on health in later life. They mentioned that the immune system matures through interactions with the gut microbiota. Gut microbiota promotes the development of the immune system; on the other hand the host immune system has an influence on the development of the gut microbiota. Changes in the development of gut microbiota during early ages of life can negatively effect on immune system and results in the onset of allergies [6].

Sjögren et al. [7] studied 16 allergic and 31 non-allergic individuals during their first five years of life. They measured the frequency and relative amounts of Bifidobacterium and Lactobacillus in the stool of the study subjects by the real-time PCR method. They found a significant reduction in the colonization of these bacterial genera in children with allergy. They thus concluded that these kinds of bacteria might prevent allergy development during the childhood. Johansson et al. also confirmed their findings by showing that the early intestinal colonization with Lactobacilli is protective against allergy at early ages in spite of the allergic heredity [8].

There is a lot of information on scientific literature about the role of the gut microbiota in preventing of respiratory and food allergies, but there are a few studies regarding the role of respiratory microbiota in the prevention of respiratory allergies or asthma. Panzer et al. [9] by focusing on gut microbiota reviewed the relationship between the respiratory and gut microbiota with allergy and asthma. They concluded that dysbiosis in the microbiota composition at both the respiratory and gastrointestinal mucosal surfaces causes functional changes in microbiota which alters host interactions and host immune responses resulted in disease susceptibility [9].

Goleva et al. [10] studied the effects of airway microbiota on corticosteroid responsiveness in asthma, they mentioned that the functional and pathologic impact of the airway microbiota in asthma remains unknown, but they showed that airway cell stimulation by bacteria as a result of alterations in the airway microbiota composition and expansions reduce cellular responses to corticosteroids and influences on the efficacy of corticosteroid treatment in asthmatic patients [10]. The composition and diversity of airway microbiota proposed to be considered as a factor which may influence on the susceptibility to respiratory allergy and asthma, however more high quality studies are required in this field to determine the exact effects and mechanisms, the protective bacterial strains in the respiratory microbiota and proposing the ways for prevention and controlling of such disease through making changes in the composition of the airway microbiota.

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