

Food, Respiratory Allergies and Microbiota Transplantation

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Abstract

The present mini-review explores the possible advantages of employing intestinal microbiota transplantation (IMT) to treat severe respiratory, dermatological, and other allergies. The mechanism of IMT is the restoration of the intestinal microbiota, thus countering intestinal dysbiosis and attenuating the excessive gastrointestinal inflammatory it causes. Inflammation is a key factor in allergic processes. Several other conditions contribute to allergies, including caesarean childbirth and the excessive use of antibiotics in children and pregnant women. According to the available evidence, IMT can alleviate various allergies, assuming the proper application and consideration of the FDA recommendations stemming from the current coronavirus crisis.

Keywords: Food Allergies; Intestinal Microbiota; Intestinal Microbiota Transplantation; U.S. Food And Drug Administration

Introduction

Since respiratory, dermatological, and other allergies have increased substantially in recent years, it is necessary to explore measures capable of minimizing this problem [1]. For the treatment of allergies, various studies have focused on the impact of the microbiome [2,3], which is known to modulate diverse functions of the immune system [4,5]. Indeed, the microbiota plays a transcendental role in the development of early immunity [6]. This can be explained by the fact that microorganisms have existed for millions of years and have evolved to the capacity of masterfully manipulating the immune response of their mammalian hosts [7].

The intestinal microbiota is able to prevent or suppress immune disorders resulting from the inappropriate response of the organism to harmless antigens. Hence, the function of these microorganisms has been studied in relation to the treatment of allergic conditions [8]. One such treatment is intestinal microbiota transplantation (IMT), which is capable of alleviating numerous allergic conditions, such as ulcerative colitis as an allergic reaction to 5-aminosalicylic acid [9], food allergies that lead to intestinal dysbiosis [10-12], allergic colitis in pediatric patients [13], eczema, atopic dermatitis, allergic rhinitis and asthma [14-16].

IMT counters sustained intestinal dysbiosis, which is a key factor in allergic processes because of causing an excessive gastrointestinal inflammatory response [17-21]. The mechanism of IMT is the restoration of the intestinal microbiota and important metabolites for the

host (e.g., short-chain fatty acids, antimicrobial peptides, bacteriocins, and secondary bile acids). As a consequence, IMT improves the function of the intestinal barrier and restores the effectiveness of host immune activity [22].

The inflammatory process resulting from intestinal dysbiosis can give rise to airway disorders, contributing to the hyperresponsiveness of the bronchi and bronchoconstriction [23]. For example, there is a close relation between the physiopathology of asthma and the makeup of the microbiota. Hence, the use of IMT as a treatment for asthma is worthy of further research in order to add to the limited data currently available on this subject [24].

We must consider that the IMT began successfully treating *Clostridoides difficile* infection, and that from then on, it has addressed numerous pathologies, among which the following stand out: Irritable Bowel Syndrome, anxiety, metabolic syndrome, fatty liver, non-alcoholic, depression, Ulcerative Colitis, constipation, some dermatological processes, cancers, Neurodevelopmental Disorders, including Autism Spectrum Disorder, as well as Alzheimer's Disease and many others.

Since the allergy disorder is a multifactorial process, we must delve into it, in such a way that we see that there is a genetic predisposition, personal and racial susceptibility. Environmental contacts, seasons, tobacco, parasites, food, medications, the presence of infections, psychic processes and others that determine it [25].

We also see that the Microbiota is altered in allergic processes, being of different intensity [26].

It is interesting that the majority of microorganisms in the microbiome of a healthy individual are constituted by *Firmicutis*, *Bacteroidetes*, and *Actinobacteria* [27]. On the other hand, a majority of *Clostridiaceae* and *Enterobacteriaceae* in the microbiome of an individual is associated with the development of allergic disorders [28]. As can be appreciated, the nature of the microbiota of an individual must be considered when choosing a donor for IMT.

According to the hygiene hypothesis of allergies, there is a higher probability of allergic diseases and asthma in children in cases where the incidence and levels of bacteria in the home are low. In this sense, children from large families have shown a relatively low incidence of allergic rhinitis, asthma, and atopic dermatitis [29]. The "old friends" and counter-regulation hypotheses have also been proposed [30]. The former poses that the adaptive immunity of children develops if they are exposed to symbiotic microbes. The latter hypothesis is similar, based on a finding of the secretion of IL-10 by regulatory T cells, monocytes, macrophages, and dendritic cells as an immune response to parasitic and bacterial infections. In many cases, curiously, allergies exist for children who have an "ideal" profile: the consumption of little or no antibiotics, a home environment without furry pets, a natural childbirth, and a mother who did not take antibiotics during pregnancy [31].

The transplantation of a healthy gut microbiota has been used successfully to manage different types of severe allergies, such as *Clostridoides difficile* infection, inflammatory bowel disease, irritable bowel syndrome, and intestinal failure associated with hypersensitivity [32-35]. The retention enema is the only known effective technique for this therapeutic treatment. It is important to point out that the colonic mucosa does not have a healthy appearance after the procedure [36].

Within the selection of donors we must consider the following

- That his laboratory tests are normal.
- That their Clinical History for the Donor be totally normal and that all the causes that can be transferred to the patient be systematically searched for, avoiding them.
- The donor exercises

- Preferably use donors between 18 and 25 years old
- If we manage to detect completely healthy children between 6 and 8 years old, they would be the ideal donors.
- Relentlessly seek super-donors.

With the proper selection of donors, the IMT has a high rate of success in treating allergies [37]. It is necessary to standardize the IMT procedure by considering the many variables capable of influencing the outcome [38]. Furthermore, the therapy must be adapted to distinct types of allergies. On the other hand, the consumption of probiotics, prebiotics, and symbiotics can alleviate moderate allergies [39-44]. Finally, it is crucial to follow the recommendations of the FDA derived from the presence of the SARS-CoV-2 infection [45].

Conclusions

Several strategies are known to reduce the incidence of allergies and/or ameliorate allergic conditions. The consumption of probiotics, prebiotics, and symbiotics usually alleviate moderate allergies. For some severe allergies, IMT has produced a significant improvement. To avoid allergies, the administration of antibiotics to children and pregnant women should be kept to a minimum. Finally, it is necessary to regulate the utilization of the caesarean section to avoid its excessive use.

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Conflicts of Interest

The authors declare that they do not have any conflict of interests.

Ethical Approval

This report does not contain any study with human or animal subjects carried out by the authors.

Informed Consent

The authors obtained informed written consent from the patients in order to develop this article.

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