GenoScreen
Innovative Genomics

Press release

A microbial signature in indoor air associated with severe asthma

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Researchers from GenoScreen and the Cardio-Thoracic Research Centre of Bordeaux (Inserm U1045) have demonstrated relationships between microorganisms in indoor air and those in asthmatic patients' lungs. This work, published in the Journal of Allergy and Clinical Immunology, also shows a variation in these micro- and mycobiota according to the patients' inflammatory reaction type (T2 endotype).

Asthma is the most common chronic disease in children, although it can start at any age. It can be recognized by the recurrent episodes of breathing difficulties, called asthma attacks. Some acute attacks can last several hours or even days, conventional treatments not being able to calm them down. These episodes are called exacerbations.

The WHO estimates that currently 339 million people worldwide suffer from asthma. The deaths due to asthma are estimated to be more than 417,000 in 2016[1], and WHO alerts on their increase in the next 10 years without public health measures[2].

Although the root causes of asthma are currently unknown, many risk factors have been identified, including bacteria and mildew of ambient air. The severity of asthma can also be reduced by limiting the exposure to the known triggers of its exacerbations (allergens, viruses, etc.).

This pilot study published in the "*Journal of Allergy and Clinical Immunology*[3]" is the first to highlight a relationship between the pulmonary bacterial and fungal communities of severe asthma patients and those of the indoor air in their homes. Carried out by the Cardio-Thoracic Research Center of Bordeaux (CRCTB, Inserm U1045, University of Bordeaux, Inserm, Bordeaux University Hospital) and GenoScreen (Lille), this study demonstrated a microbial signature in these microbial communities, specific to severe asthma, depending on the nature of the patients' inflammatory reaction. (Endotype T2.)

In this research study, a capture device of aerial microorganisms was placed in the residencies of 22 patients from southwestern France (New Aquitaine), selected from the national COBRA cohort (*Cohorte Obstruction Bronchique et Asthme*) for a period of 10 weeks. Using a targeted metagenomics approach, the researchers characterized the microbial communities collected and compared them to the lung communities of these 22 patients during clinical stability or exacerbation periods.

[1] https://www.who.int/fr/news-room/fact-sheets/detail/asthma
[2] https://www.who.int/features/factfiles/asthma/fr/
[3] doi.org/10.1016/j.jaci.2020.08.035

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By comparing the results, they were able to state following outcomes:

- The indoor-air in the homes of patients with endotype T2-high severe asthma is characterized by a particular microbial signature, with higher bacterial diversity and lower fungal diversity, compared to that of patients with endotype T2-low severe asthma.
- The indoor-air in the homes of patients with T2 severe asthma has a significant enrichment of fungi and bacteria of medical interest, such as *Aspergillus*, *Candida*, *Sphingomonas* and *Pseudomonas.*
- The respiratory mycobiome of severe asthma patients shares more fungal genera with the indoor-air mycobiome during the exacerbation phases than during stable periods.

The results of this preliminary study are opening new research opportunities, both to deepen the knowledge on the microorganism exchanges between the environmental and pulmonary microbial communities; but also, to a better understanding of this disease, its factors and the triggers of these exacerbations. Such researches could ultimately improve the management of patients with severe asthma.

Article

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About GenoScreen

GenoScreen is a French biotech company founded in 2001, specialized in genomics and bioinformatics.

Its innovation strategy through research enables it to offer innovative services and solutions to academic and industrial research teams for analyzing and exploiting the DNA characteristics of all types of genomes and metagenomes.

Its business portfolio is organized into 3 divisions:

- A **Services division**, which provides standardized and customized analysis services, under ISO quality standards, for all types of genome (human, animal, plant and microbial).
- An **Expertise division** that meets the research and consulting needs of companies developing genomics-related projects. GenoScreen is particularly recognized for its expertise in the analysis of microbial genomes and metagenomes,
- An **Innovations division** that produces and markets analysis and control solutions tools that meet the needs of various activity sectors (health, cosmetics, agri-food, agronomy, environment, etc.).

Its mission: Mastering genomic information at the service of human health and its environment.