

Leveraging Digital Technology

FOR PREVENTING AND TREATING CHRONIC RESPIRATORY DISEASES

Chronic respiratory diseases are complex conditions influenced by a multifaceted interplay of genetic, microbial, and environmental factors. Understanding this intricate relationship is crucial to developing effective preventive and treatment strategies.

Exposome mapping, a relatively novel concept in the field of medicine, offers a promising approach to unravelling the environmental component of these diseases. By comprehensively analysing an individual's lifetime exposure to various environmental factors, exposome mapping provides valuable insights into the root causes of chronic respiratory diseases. In this article, Janne Goossens, who holds a master's and doctoral degree from KUL (Katholieke Universiteit Leuven) in Biomedical Sciences, explores environmental triggers and its integration in clinical practice to address respiratory diseases effectively. As a Research Associate at KUL, in the Allergy and Clinical Immunology Research Group, and Project Manager at IDEWE (an external service for prevention and protection at work), she continues to contribute to exposome-related projects addressing workplace well-being and exposure concerns.

RESPIRATORY HEALTH MONITORING

The respiratory tract is a barrier system protecting us from environmental factors or pollution. But as we breathe, we are continuously exposed to external triggers in the air. Pollution can damage the respiratory epithelium, interacting with the immune system. This might create a pathway for harmful substances, enabling them to infiltrate the body and possibly initiate chronic inflammation. Therefore, monitoring the respiratory tract is critical. Various factors contribute to respiratory health risks, including climate change-induced allergen release, air pollution,

weather conditions, pollen allergens, viruses, and lifestyle-related factors. Understanding and addressing these exposures is paramount to mitigating respiratory health issues. This requires comprehensive monitoring of big data and advanced analytical statistics.¹

Mobile health technology (mHealth) provides opportunities for integrating various data sources and geolocations that aid in exposome mapping. This process involves quantifying individual exposures to environmental agents throughout a person's lifetime. Digital technologies such as smart sensors, spirometers, and mobile health applications can efficiently monitor exposures and interactions, thereby elucidating the correlation between the exposome and health outcomes. This, in turn, can help detect patterns and manage chronic respiratory diseases. Although the market for mobile health apps is rapidly evolving, most tools are still undergoing trials. Nonetheless, interactive self-care systems have

shown promising results in improving asthma control through practical self-monitoring and management.

PREVENTION AND TREATMENT

Digital technology has the potential to improve results for patients with chronic respiratory conditions through various means. Firstly, mHealth can raise awareness about medical conditions and enhance medication adherence. Additionally, it can highlight how minor lifestyle adjustments can positively impact disease management. Furthermore, digital technology facilitates the exploration of relationships between environmental exposures and clinical effects, utilising devices such as wireless spirometers and activity trackers for chronic disease management. While these technologies offer personalised interventions and can function as early warning systems for patients with respiratory ailments, their effectiveness requires validation and careful consideration of specific patient needs.

Digital technology can improve chronic respiratory condition outcomes through awareness, medication adherence, lifestyle impact, and personalized interventions.



1. Exposome mapping in chronic respiratory diseases: the added value of digital technology, Goossens et al.

MY PULMONARY RESEARCH

PATIENTS

NAVIGATING CHALLENGES

Despite the numerous opportunities, the integration of digital technologies into clinical practice also poses challenges. Prolonged and consistent use of mHealth applications can be particularly challenging, especially given the chronic nature of many diseases. Ensuring data relevance, accuracy, and completeness is imperative, particularly when the data is intended for scientific research. However, reliance on patients for self-management of these applications may compromise the data.



While you breathe, you are continuously exposed to environmental pollutants that can damage the respiratory tract.

Additionally, to deliver value to healthcare providers, mHealth applications must prioritise time efficiency, requiring effective data filtering. Before implementation, it is crucial to validate the impact of applications and notifications intended for behavioural change or treatment. Moreover, patients should receive adequate support in using devices and monitoring data to ensure accurate data collection. Finally, compliance with regulatory and privacy requirements is essential to guarantee patient safety and data security.

SHAPING PUBLIC POLICY

At the European level, there is a comprehensive approach aimed at identifying common environmental exposures across diverse populations. This concerted effort underscores the importance of understanding and addressing environmental factors that may impact health and well-being on a societal level.

There are numerous European projects dedicated to exposome research, funded by the EU's research and innovation funding programme Horizon 2020. These projects concentrate on areas such as respiratory health and allergic reactions. The primary goals of these projects are to address immune-related disorders and occupational exposures (like EPHOR), aligning with Europe's 'green deal' objectives and targeting specific exposure groups to advance the understanding of environmental health risks.

CONCLUSION

Exposome mapping through digital technologies holds promise for patients with chronic respiratory diseases, offering benefits such as increased awareness, insights into environmental exposure, and enhanced disease control. However, continued research and clinical validation are required to fully realise its potential. Moving forward, maintaining a focus on collaboration, innovation, and ongoing research are the primary components for enhancing continued advancement in this dynamic field.



About dr. Janne Goossens

Janne Goossens (PhD), obtained her master degree in Biomedical Sciences at KU Leuven in 2018 in basic and translational sciences. Afterwards, she started her PhD in 2018 at the Research Group Allergy and Clinical Immunology at KU Leuven, under the supervision of Prof. Dr. Lieven Dupont and Prof. Dr. Dominique Bullens. Here, she studied airway inflammation as a result of external triggers inducing epithelial cell damage in exercise-induced bronchoconstriction and non-allergic asthma. She successfully defended her PhD in June 2023 and was awarded with multiple prizes including Lung Paediatric Award in 2021 and GSK Clinical Science Award in 2023 of Belgian Respiratory Society (BERS). She developed expertise in performing multi-center clinical studies, in vitro cell culture, RNA-Seq, project management and scientific writing. She investigated the complex interrelationships among our immune system, environmental exposures (exposome), and the well-being of our respiratory system, indicating the importance of exposome mapping and prevention. Afterwards, she has been working as Project Manager at IDEWE, external service for prevention and protection at work. Here, she is involved in multiple (inter)national studies on exposome like EPHOR, EIRENE and BOCCA.

ABOUT EU.RECA

The European Respiratory Cluster Antwerp provides a knowledge platform that focuses on the lung as a crucial part of the body, the healthy functioning of this vital organ and combating lung disease. There are many developments in the respiratory sector; the prevalence of lung disorders is increasing, but there is also a tremendous drive to get new treatments on the market.

As a catalyst for innovation, we bring promising start-ups into contact with leading companies, pharma with product designers, academics with entrepreneurs, and investors with patients. That is why our approach is based on interaction. Our extensive network will ensure a top-quality pool of participants; our workshops and symposia will encourage in-depth dialogue.

eu.reca facilitates innovation in the respiratory sector by providing innovation and business support for late-stage researchers, start- and scale-ups.

Visit www.eureca.world for more respiratory-related research insights from within our network, business services and events.

eu.reca fuels discussions by sharing point of views, research insights and innovations focused on respiratory health. Got something to share or interested to support? Reach out via info@eureca.world.