LUXEMBOURG INSTITUTE OF HEALTH

PRESS RELEASE

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The Sound of COVID-19

Researchers in Luxembourg discover how to use vocal biomarkers to monitor COVID-19

The Predi-COVID Cohort study, a project led by Dr Guy Fagherazzi of the Luxembourg Institute of Health, showed for the first time that vocal recordings of COVID-19 affected people could be used to monitor related symptoms of the disease. This new biomarker-based technology could become a novel easy way for healthcare practitioners to provide at risk-patients with immediate help, as well as relieve some burdens on the healthcare system.

COVID-19 is a very heterogeneous disease. While some people are asymptomatic or exhibit only mild symptoms, others require hospital care or even die. For some patients, recovery is quick whereas others are chronically affected by Long COVID. The symptoms themselves also vary from person to person, ranging from fever, cough or body aches to loss of smell or nausea, and can appear alone or in any number of combinations. All of these factors make individual tailored medical care in response to the disease an absolute necessity.

If physicians were able to remotely monitor mild cases and quickly assess the symptoms, this would certainly take some weight off the overall healthcare system, giving the priority to more severe cases. Appropriately followed, the affected patients could then seek more precise medical care, if necessary. A recently published study led by Dr Guy Fagherazzi, Director of the Luxembourg Institute of Health Department of Precision Health and Group Leader of the Deep Digital Phenotyping Research Unit, describes a novel method by which this could be possible. Namely, that of vocal biomarkers.

The researchers obtained vocal data via Predi-COVID, a study of people who tested positive for COVID-19. Participants regularly recorded themselves with their smartphones while reading a set text and then filled out a questionnaire about their symptoms and general health status. The 272 participants were then divided into two different groups: symptomatic and asymptomatic. Audio features were extracted and compared between the groups and the data was fed into an artificial-intelligence based model in order to predict the symptomatic status. As Dr Fagherazzi explains, the researchers were able to *"derive a vocal biomarker that could be used to accurately monitor symptomatic and asymptomatic individuals with COVID-19*."

This pioneering study is the first to use spoken voice recordings, as opposed to coughing or breathing, from various devices, and in a real world environment to identify COVID-19-related symptoms. In the future, healthcare practitioners will be able to use this novel technology to both screen patients as well as track the progression of their symptoms via remote monitoring, using cheap and non-invasive tools like smartphones. It could also be a practical solution for monitoring Long COVID patients over an extended period in order to anticipate the evolution of their symptoms.

"*Such a vocal biomarker could be integrated into future telemonitoring solutions, digital devices, or in clinical practice*. *It offers an easily available, non-invasive tool to collect data that can be used from home*. *This could*

revolutionise the way patients are monitored, treated, and offer a much needed solution to relieve the burden from our healthcare systems," concludes Dr Fagherazzi.

The study was published on October 20th in PLOS Digital Health. The full article can be found under the title "*A Voice-based Biomarker For Monitoring Symptom Resolution In Adults With COVID-19: Findings From The Prospective Predi-COVID Cohort Study*" [10.1371/journal.pdig.0000112].

Funding and collaborations

The ongoing research efforts are jointly coordinated by the LIH, the Integrated Biobank of Luxembourg (IBBL), the Laboratoire National de Santé (LNS), Research Luxembourg, the Luxembourg Centre for Systems Biomedicine (LCSB) of the University of Luxembourg, the Centre Hospitalier de Luxembourg (CHL), the Fonds National de la Recherche Luxembourg, the Fondation André Losch and the Luxembourg Government.

The Predi-COVID study is supported by the Luxembourg National Research Fund (FNR) (Predi-COVID, grant number 14716273); the André Losch Foundation; and the Luxembourg Institute of Health.

About the Luxembourg Institute of Health (LIH)

The Luxembourg Institute of Health (LIH) is a public biomedical research organization focused on precision health and invested in becoming a leading reference in Europe for the translation of scientific excellence into meaningful benefits for patients.

LIH places the patient at the heart of all its activities, driven by a collective obligation towards society to use knowledge and technology arising from research on patient derived data to have a direct impact on people's health. Its dedicated teams of multidisciplinary researchers strive for excellence, generating relevant knowledge linked to immune related diseases and cancer.

The institute embraces collaborations, disruptive technology and process innovation as unique opportunities to improve the application of diagnostics and therapeutics with the long-term goal of preventing disease.

About Research Luxembourg

Research Luxembourg is a unified, agile team of thought leaders working to learn, explore and make an impact to shape a better future. By connecting all players in Luxembourg and abroad, Research Luxembourg aims to become a leader in research and innovation focusing on four research priority areas: (1) Industrial and Service Transformation; (2) Personalised Healthcare; (3) Sustainable and Responsible Development; (4) 21st Century Education.

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Scientific contact

Dr Guy Fagherazzi, PhD, ADR
Director of Department of Precision Health
Head of the Deep Digital Phenotyping Research Unit
Luxembourg Institute of Health
Tel: +352 6 21 58 95 54
Email: guy.fagherazzi@lih.lu

Press contact

Arnaud D'Agostini
Head of Marketing and Communication
Luxembourg Institute of Health
Tel: +352 26970-524
E-mail: arnaud.dagostini@lih.lu