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Air Pollution Does Not Increase the Risk of Getting Infected but Does Increase the Risk of Getting Sick from COVID-19

A study examines the association between antiviral antibodies, COVID-19 symptoms, and long-term exposure to air pollution in a cohort in Catalonia

Barcelona, 17 November, 2021- Long-term exposure to **air pollution** is associated with a **higher risk of developing COVID-19** among those people who get infected, shows a study led by the Barcelona Institute of Global Health (ISGlobal), a centre supported by the "la Caixa" Foundation, and co-led by the GCAT| Genomes for Life-Germans Trias i Pujol Research Institute (IGTP), Badalona. The [study](#), published in *Environment Health Perspectives*, provides further evidence on the health benefits of reducing air pollution.

A series of studies suggest that regions with higher **pre-pandemic levels of air pollution** had a **higher incidence of COVID-19 cases and deaths**. However, the reasons for this associations are not yet clear; air pollution could favor airborne transmission of the virus, or it could increase an individual's susceptibility to infection or disease. "The problem is that previous studies were based on reported cases, which had been diagnosed, but missed all the asymptomatic or undiagnosed cases," says **Manolis Kogevinas**, ISGlobal researcher and first author of the study.

The research team decided to combine the [technology developed by Carlota Dobaño's team](#) to measure a series of **virus-specific antibodies** in a **cohort of adults living in Catalonia** (the [COVICAT](#) cohort), with information on the long-term exposure of such individuals to air pollutants (NO₂, PM_{2.5}, black carbon and ozone).

"This is the first study to perform **mass screening** of SARS-CoV-2 specific antibodies in an adult cohort to examine the association between their residential exposure to air pollution before the pandemic, SARS-CoV-2 infection, and disease," says **Cathryn Tonne**, cosenior author of the study together with Dobaño.

Higher viral burden and/or symptom severity

The study included **9,605 participants** among which there were 481 confirmed cases (5%). In addition, **blood samples** from over 4,000 participants were taken to determine the presence and quantity of IgM, IgA and IgG antibodies to five viral antigens. Of these, 18% had virus-specific antibodies, but no association was found between infection and exposure to air pollutants. However, among those who were seropositive (i.e. got infected), an association was found between **higher exposure to NO₂ and PM_{2.5}** and higher levels of IgG specific for the five viral antigens (an indication of **higher viral burden and/or symptom severity**).

For the total study population (the 9,605 participants), an association was found between higher exposure to NO₂ and PM_{2.5} and disease (symptoms), particularly for **severe cases** that ended in the hospital or in intensive care. The association with PM_{2.5} was stronger for **men over 60 years of age and people living in socioeconomically deprived areas**.

Strongest evidence globally

"Our study provides the strongest evidence globally on the association of ambient air pollution and COVID-19," says Kogevinas. "These results are in line with the **association between air pollution and hospitalization** described for other respiratory diseases

such as **influenza** or **pneumonia**". Air pollution could also contribute by favouring the development of cardiovascular, respiratory or other **chronic conditions**, which in turn increase the risk of severe COVID-19.

"The combination of individual genetic risks that we have previously identified in COVICAT individuals and this **new data** on environmental impact caused by air pollution exposure will contribute to understanding the complex interplay and mechanisms underlying the severity of COVID-19", says Rafael de Cid, from the IGTP.

The authors conclude that the results provide additional support for the public health benefits of reducing air pollution levels, and highlight **the influence of environmental factors on infectious diseases**.

Reference

Kogevinas M, Castaño-Vinyals G, Karahcaliou M, et al. [Ambient air pollution in relation to SARS-CoV-2 infection, antibody response, and COVID-19 disease: a cohort study in Catalonia, Spain \(COVICAT study\)](#). 2021. *Env Health Persp*. doi/10.1289/EHP9726.

About ISGlobal

The Barcelona Institute for Global Health, ISGlobal, is the fruit of an innovative alliance between the "la Caixa" Foundation and academic and government institutions to contribute to the efforts undertaken by the international community to address the challenges in global health. ISGlobal is a consolidated hub of excellence in research that has grown out of work first started in the world of health care by the Hospital Clínic and the Parc de Salut MAR and in the academic sphere by the University of Barcelona and Pompeu Fabra University. Its working model is based on the generation of scientific knowledge through Research Programmes and Groups, and its translation through the areas of Training and Analysis and Global Development. ISGlobal has been named a Severo Ochoa Centre of Excellence and is a member of the CERCA system of the Generalitat de Catalunya.

About the IGTP

The IGTP is a public research center accredited as a center of excellence by the Carlos III Health Institute. It is the umbrella for the research activity of the Germans Trias i Pujol University Hospital located on the Can Ruti Campus in Badalona, close to Barcelona. IGTP leads the GCAT project. The GCAT|Genomes for Life, A Prospective Study of the Genomes of Catalonia is a long-term project to follow the health outcomes of 20,000 volunteers over time. Medical, biological and lifestyle information is being studied to uncover information on risk factors and also on co-morbidities.

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