

# Long-term exposure to ambient air pollution and antibody response to SARS-CoV-2 vaccination in an Italian population cohort of elderly



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## Hypothesis

Long-term exposure to fine particulate matter (PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>) **reduce the antibody response to SARS-CoV-2 vaccination** in the elderly

## Methods

N=1505 participants to the RoCAV study cohort were recalled in 2021-22. S-RBD IgG antibody tests assessed in serum samples, in n=1418 after at least 1 vaccine dose



**SARS-CoV-2 vaccination** at time of serology: linkage with health database



**Annual mean exposure** to PM<sub>2.5</sub>, and NO<sub>2</sub> - year 2019, linked to latest known residency address



**Lifestyles, comorbidities and treatments:** questionnaire & linkage with health databases

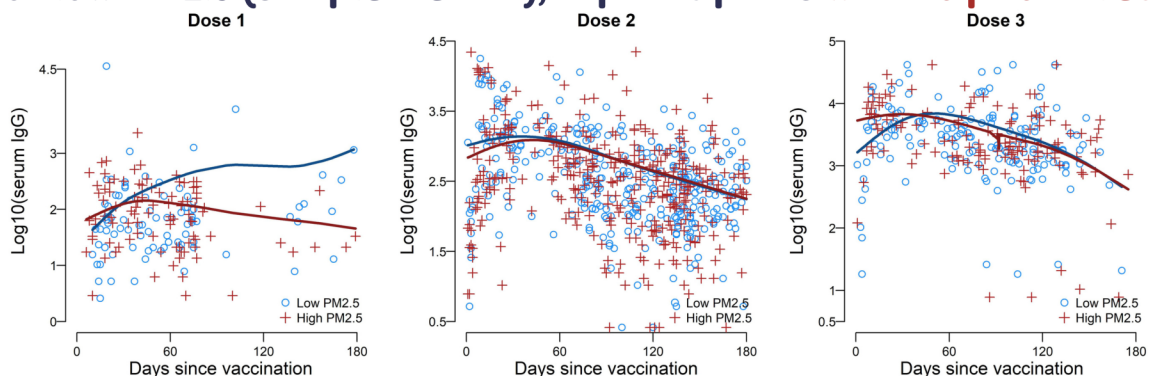


**GAM models:** percentage change in IgG geometric mean, per 1 IQR increase in pollutants

Age, years (mean±SD)	75.0±4.9
Men, n (%)	743 (52.4%)
Current smokers, n (%)	165 (11.6%)
Autoimmune disease, n (%)	33 (2.3%)
Immunosuppressant trt, n (%)	80 (5.6%)
Days since last vaccination	
Mean±SD	91±57
Range (min-max)	0-354
Evidence of previous infection at time of serology, n (%)	
No	1240 (87.5%)
Yes	178 (12.5%)
Vaccine doses, n (%)	
One	238 (16.8%)
Two	832 (58.7%)
Three	348 (24.5%)

## Results

Vaccine responses in time since last vaccination, by exposure to high or low PM<sub>2.5</sub> (sample median), in participants **with no prior infection**



## Percentage change in serum IgG (with 95%CI):

	No prior infection	All participants
<b>PM<sub>2.5</sub> (per 1.2 microgr/m<sup>3</sup>)</b>		
All times, all doses	-6.3% (-12.8%; 0.7%)	-4.5% (-11%; 2.5%)
Time less than 180 days	-7.1% (-13.6%; -0.2%)	-7% (-13.3%; -0.1%)
<b>NO<sub>2</sub> (per 3.6 microgr/m<sup>3</sup>)</b>		
All times, all doses	-0.6% (-8.1%; 7.5%)	1.2% (-6.3%; 9.4%)
Time less than 180 days	-0.6% (-8.2%; 7.6%)	-1% (-8.5%; 7%)

GAM models with restricted CS for time since last dose, adjusting for age, sex, vaccination strategy, smoking status, history of autoimmune disease and immunosuppressant treatments

## Take Home Message:

Long-term exposure to PM<sub>2.5</sub> associated with **lower SARS-CoV-2 vaccine response** in this Italian elderly population