COVID-19, air pollution and population density

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Reply to: "COVID-19 pandemic and environment: not only air pollution". M.Carminati et al.

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Dear Editor,

We fully agree with Carminati and co-workers that air pollution is not the only determinant influencing the incidence and severity of COVID-19. Individual severity factors have been intensively studied and reported[1]. Nevertheless, the review of our data (data not shown) allows us to confirm that the death rate, even after adjusted for population density, was higher in the regions of northern as compared to that of southern Italy[2].

More than the geographical population density, it has been suggested that, in addition to other variables mentioned in our paper, the population density in confined spaces, such as homes and working places, may influence the virus spread[2,3]. However, the high population density in confined spaces existing in some southern cities, where many people live in small houses, was still associated with a lower mortality rate compared to that of northern cities[2].

Therefore, we still think that environmental air pollution represents a major factor in influencing COVID-19 burden and mortality. Certainly, although not shown by data collected in the three cities considered by Carminati and co-workers, the level of air pollutants in northern Italian cities has unanimously been reported to be significantly higher than that in southern Italian cities.

On the other hand, the objective of our work was not to confirm the role of air pollution in COVID-19 – documented by several studies worldwide- but to suggest a mechanism through which an epithelial damage – also caused by other offending agents and common in other "epithelial barrier diseases" – may result in the immune changes typically associated with severe COVID-19[4]. In accordance with the epithelial barrier hypothesis, it was recently reported that bacterial DNA passage to circulation, a marker of epithelial barrier leakiness in the gut, has been shown to be linked to severe COVID-19[5].

Moreover, although recent studies suggest that even a short-term exposure to pollutants is associated with SARS CoV-2 infection[3], chronic exposure has a more relevant role in influencing incidence and severity of COVID-19 than actual values of pollutants during the pandemic, possibly influenced by the reduced vehicle traffic and industrial emissions.

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