Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

AR: current knowledge and future strategies. World Allergy Organ J 2020;13:100106.
3. Buganza E, Donzelli M, Gurrieri GL, Lazzarini M, Scotto di Marco E, Bravetti E, et al. Preliminary analysis on air quality in Lombardy during the COVID-19 emergency [in Italian]. Milan, Italy: Lombardy Regional Agency for Environmental Protection. April 03, 2020. Available at: https://www.arpalombardia.it/Pages/Qualit%C3%A0-dell%E2%80%99aria-durante-l%E2%80%99emergenza-Covid-19%2C-l%E2%80%99analisi-di-Arpa-Lombardia-.aspx. Accessed April 30, 2020.
4. Wooding DJ, Ryu MH, Hüls A, Lee AD, Lin DTS, Rider CF, et al. Particle depletion does not remediate acute effects of traffic-related air pollution and allergen: a randomized, double-blind crossover study. Am J Respir Crit Care Med 2019;200:565-74.
5. Sedghy F, Varasteh AR, Sankian M, Moghadam M. Interaction between air pollutants and pollen grains: the role on the rising trend in allergy. Rep Biochem Mol Biol 2018;6:219-24.
6. Tovey E, Marks G. Methods and effectiveness of environmental control. J Allergy Clin Immunol 1999;103:179-91.
7. Poole JA, Barnes CS, Demain JG, Bernstein JA, Padukudru MA, Sheehan WJ, et al. Impact of weather and climate change with indoor and outdoor air quality in asthma: a Work Group Report of the AAAAI Environmental Exposure and Respiratory Health Committee. J Allergy Clin Immunol 2019;143:1702-10.

Available online June 22, 2020.
https://doi.org/10.1016/j.jaci.2020.05.047

Reply

To the Editor:

We read with interest the relevant comment of Gallo et al[1] concerning our recent Editorial.[2] Globally, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak has upset the lifestyle of humans, increasing sedentary behaviors with quarantine (ie, staying at home, tele-working, screen activities), the fear of contagion (ie, social connections, mass transit, and compulsive disinfecting), and probably a city dweller migration to the periphery of crowed cities and surrounding countryside. As explained by the authors, this exceptional period seems to be salient to explore the complex interplay of interactions between exposome (ie, indoor and outdoor expositions), genetic heritage, lifestyle, and allergic diseases expression. Interestingly, more than half the people stayed at home to prevent the spreading of SARS-CoV-2 during the several months of quarantine, involving a massive decrease in greenhouse gas emissions related to human activities. Considering the irritative factor of air pollution for the respiratory tract, the eyes, and the skin, we could attempt a reduction in allergic exacerbations mediated by nonspecific inflammation. Considering that filtering face piece respirators (FFPs) reduced the penetration of fine particulates ranging from 80% (FFP1) to 99% (FFP3), their global use during the coronavirus disease 2019 pandemic could protect people against outdoor and indoor allergenic components.[3] However, the authors rightly highlighted that people were particularly exposed to biological aeroallergens (ie, dust mites, domestic animals, or molds) and chemical components (ie, ammonia, solvent, tobacco, and cooking smokes) of home indoor environment during quarantine. Similar to the concentration of diesel exhaust particles in a vehicle cabin exposed to heavy traffic, nonventilated houses could condense the toxicity of outdoor air pollution during several days. During the past decades, some countries have developed models of energy other than petroleum to promote more renewable energy sources, that is, wave power, offshore wind power, photovoltaic, or wood. However, it is widely accepted that home exposure to wood smoke causes inflammation in the respiratory system.[4] Promoting warm and humid environment, indoor activities (ie, tele-working, cooking, and indoor sports) could improve the exposition of airborne fungal spores in damp houses, increasing the incidence of asthma and allergic diseases.[5] Outdoor sports practice being prohibited, some people could run or cycle in their home. Moreover, evidence data showed that air pollutant exposure during exercise could decrease the pulmonary and vascular function in healthy individuals, increasing systemic and airways inflammation and amplifying the dose of pollutants during endurance physical activity.[6] Thus, the benefit of the decrease in air pollution could be attenuated by the massive exposure to indoor pollutants, aggravated by the toxicity of disinfectants such as bleach, rubbing alcohol, or quaternary ammonium—massively used to limit the spreading of SARS-CoV-2. Considering that the Hygienic Hypothesis highlighted the major role of microbiome to regulate the immune response to allergens, it would be very interesting to evaluate the impact of the extensive use of hygienic measures on the incidence of allergic diseases.[7] Because of the fear of contagion, people may avoid mass transit and increase their commuting by individual car, which may in turn promote air pollution—and the release of the highly allergenic fine particulate matter. We may therefore see a bimodal response: a decrease in air pollution during the confined period, followed by an increase in air pollution—concomitantly with the effort of worldwide governments to kickstart economic growth (despite ecological engagements). To conclude, it will be salient to analyze the aforementioned factors related to allergic diseases in forthcoming months, to better understand the complex relation between allergens, air pollution, immune response, and exacerbation of allergic diseases.

Valentin Navel, MD[a]
Frédéric Chiambaretta, MD, PhD[a]
Frédéric Dutheil, MD, PhD[b]

From [a]Université Clermont Auvergne, CNRS, INSERM, GReD, Translational Approach to Epithelial Injury and Repair, CHU Clermont-Ferrand, University Hospital of Clermont-Ferrand, Ophthalmology, and [b]Université Clermont Auvergne, CNRS, LaPSCo, Physiological and Psychosocial Stress, CHU Clermont-Ferrand, University Hospital of Clermont-Ferrand, Preventive and Occupational Medicine, Witty Fit, Clermont-Ferrand, France. E-mail: valentin.navel@hotmail.fr.

Disclosure of potential conflict of interest: The authors declare that they have no relevant conflicts of interest.

REFERENCES

1. Gallo O, Bruno C, Locatello LG. Global lockdown, pollution, and respiratory allergic disease: are we in or are we out? J Allergy Clin Immunol 2020;146:542-4.
2. Navel V, Chiambaretta F, Dutheil F. Will environmental impacts of social distancing due to the SARS-CoV-2 pandemic decrease allergic disease? J Allergy Clin Immunol 2020;146:70-1.
3. Jung H, Kim JK, Lee S, Lee J, Kim J, Tsai P, et al. Comparison of filtration efficiency and pressure drop in anti-yellow sand masks, quarantine masks, medical masks, general masks, and handkerchiefs. Aerosol Air Qual Res 2014;14:991-1002.
4. Rokoff LB, Koutrakis P, Garshick E, Karagas MR, Oken E, Gold DR, et al. Wood stove pollution in the developed world: a case to raise awareness among pediatricians. Curr Problems Pediatr Adolesc Health Care 2017;47:123-41.
5. Garrett MH, Rayment PR, Hooper MA, Abramson MJ, Hooper BM. Indoor airborne fungal spores, house dampness and associations with environmental factors and respiratory health in children. Clin Exp Allergy 1998;28:459-67.
6. Zhang J, Zhu T, Kipen H, Wang G, Huang W, Rich D, et al. Cardiorespiratory biomarker responses in healthy young adults to drastic air quality changes surrounding the 2008 Beijing Olympics. Res Rep Health Eff Inst 2013;5-174.
7. Weber J, Illi S, Nowak D, Schierl R, Holst O, von Mutius E, et al. Asthma and the hygiene hypothesis: does cleanliness matter? Am J Respir Crit Care Med 2015;191:522-9.

Available online June 22, 2020.
https://doi.org/10.1016/j.jaci.2020.06.003