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.

identified in adults exposed to PM, black carbon, and O_3, involving an increase in specific immune system.[9] The change in DNAm was often observed at specific locations within the promoter region, deregulating the expression of genetic heritage. Considering that SARS-CoV-2 infection involves a proinflammatory cytokine storm as IL-6 and IL-1β, a putative hypothesis could explain that populations exposed to chronic air pollution are associated with a different COVID-19 incidence in line with chronic epigenetic deregulation. Affecting the immune system and the inflammatory pathways, DNAm related to air pollution could explain the disparities in COVID-19 in geographic zones in which genetically predisposed populations were living in climate favoring SARS-CoV-2 distribution.

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Prevalence of comorbid asthma in COVID-19 patients

To the Editor:

The article by Li et al[1] titled "Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan" provides much-needed detail to inform risk assessment in the presence of preexisting comorbidities in such patients. Given the potentially protracted time line for complete eradication of the public health threat from coronavirus disease 2019 (COVID-19), there is an urgent need for such data to clarify the risk to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-infected patients with asthma, particularly because severe asthma represents a sizable patient group included in public health advice to shield/stay home.[2] Surprisingly, the authors report a low prevalence of asthma (0.9% [5 of 548]) in patients with COVID-19, markedly lower than in the adult population of Wuhan (6.4%) and hence speculate that there may be a T_H2-mediated reduced susceptibility to COVID-19 in patients with asthma.[1] A recent literature review including an additional 12 predominantly Chinese COVID-19 cohorts/cases (874 patients) showed that asthma was "surprisingly underreported,"[3] and entirely absent in a Chinese nationwide analysis of 1590 COVID-19 cases, where a lack of chronic airways disease awareness and lack of community spirometric testing were postulated reasons.[4]

TABLE I. Demographic and clinical characteristics of hospitalized asthma patients with COVID-19

Characteristic	All patients (n = 17)	No pneumonia* (n = 10)	Pneumonia (n = 7)
Age (y)	61 (28-86)	58 (28-82)	64 (46-86)
Sex: male/female	9/8	6/4	3/4
Length of hospital stay (d)†	7 (1-34)	4 (1-15)	11 (4-34)
Intensive care admission, no. of patients	1	0	1
Mechanical ventilation, no. of patients	0	0	0
Clinical outcomes			
Discharged from hospital	15	10	5
Remains hospitalized	1	0	1
Death	1	0	1

For age, data are expressed as mean (range).
*No pneumonia describes the absence of any consolidation on chest radiograph at any stage during admission.
†Length of stay data are censored at day 34 for 1 patient.

In contrast, a more recent case series from New York of 393 consecutive confirmed COVID-19 admissions documented a rate of asthma of 12.5%, slightly higher than the prevalence of current adult asthma of 10.1% in New York state.[5,6] As a European comparison of asthma prevalence in hospitalized patients with COVID-19, and with local institutional review board approval, we conducted a retrospective study in our 836-bed tertiary referral center in Dublin, Ireland. We assessed the medical records of 193 consecutive admissions who were SARS-CoV-2–positive over a 1-month period and found that 8.8% (17 of 193) had a physician diagnosis of asthma. Although most of these patients with comorbid asthma had a milder inpatient course and none required invasive mechanical ventilation, there was 1 death, related to COVID-19 and other life-limiting comorbidities (Table I). The herein-reported rate of comorbid asthma diagnosis is higher than that reported by Li et al, and is comparable to the estimated prevalence of current asthma of 7.0% in adults in Ireland.[7]

We theorize that the rate of comorbid asthma in our urban center in Ireland reflects the complex interaction of perhaps greater susceptibility to symptomatic COVID-19 in asthma and an increasingly forewarned and engaged patient population with asthma who may have recently improved their asthma medicine adherence and anticipated/better adhered to public health advice than others in advance of widespread community transmission in their geographic region. We suspect that the low comorbid asthma

prevalence observed by Li et al is less likely to indicate lower susceptibility to SARS-CoV-2 in asthma, in light of the above emerging data.[1,4,5] There remains a need for larger, more detailed epidemiologic and mechanistic studies for clarification to what extent COVID-19 poses a risk to patients of defined asthma severity.

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Reply

To the Editor:

The correspondence by Butler et al[1] titled "Prevalence of comorbid asthma in COVID-19 patients" discusses differences in the prevalence of comorbid asthma in coronavirus disease 2019 (COVID-19) in several retrospective studies. The prevalence of comorbid asthma in COVID-19 in our study was lower than the demonstrated research in New York and Dublin. The possible reasons of this phenomenon arising from several aspects, and the underlying mechanism related to susceptibility of patients with asthma to COVID-19, are discussed.

First of all, the difference in sample size will lead to the deviation in results. Richardson et al[2] recently published a report involving 5700 patients with COVID-19 in New York, showing a prevalence of patients with asthma of 9.0% (479 asthma cases), which was less than that (12.5%, 49 asthma cases of 393 patients with COVID-19) in the previous New York study and a little less than the prevalence of current adult asthma of 10.1% in New York state. Besides, nationwide analyses from Mexico and China confirmed low rates of asthma in patients with COVID-19, that is, 3.6% among 7497 cases in Mexico[3] and 0% among 1590 cases in China,[4] respectively, while the prevalence of adult patients with asthma was 5.0% and 4.2%, respectively.

Second, the difference in self-protection measurements may have further contributed to the varying prevalence rates of asthma in patients with COVID-19. A total of 120 patients with asthma, who were in our previous long-term follow-up cohort, were interviewed by Wechat software or telephone to investigate their asthma control and COVID-19 prevention in the past several months. The clinical information of the patients was confirmed on April 29, 2020, the final date of follow-up. Among these patients, data of 100 cases were available, and none of them reported COVID-19. As presented in Table I, a satisfying result of asthma control, with 89.0% controlled, was observed. During the COVID-19 outbreak, most patients (94.0%) kept staying at home following the strict prevention and control regulations of

TABLE I. Demographic characteristics and asthma control and COVID-19 prevention measures of 120 patients with asthma during the COVID-19 outbreak

Variable	Group 1 (n = 100)	Group 2 (n = 20)	*P* value
Sex, no./total no. (%)			
Males	43/100 (43.0)	13/20 (65.0)	.0718
Females	57/100 (57.0)	7/20 (35.0)	
Age (y), median (IQR)	43.5 (32.0-52.0)	40.0 (33.3-57.5)	.4058
Course of asthma (y), median (IQR)	4.5 (2.0-10.0)	6.0 (4.0-10.3)	.1511
Asthma severity, no./total no. (%)			
Nonsevere	65/100 (65.0)	17/20 (85.0)	.0792
Severe	35/100 (35.0)	3/20 (15.0)	
Type 2 phenotype (yes), no./total no. (%)	96/100 (96.0)	18/20 (90.0)	.2611
Asthma treatment, no./total no. (%)			
Step 1	24/100 (24.0)	—	
Step 2	0/100 (0.0)	—	
Step 3	36/100 (36.0)	—	
Step 4	22/100 (22.0)	—	
Step 5	18/100 (18.0)	—	
Asthma control, no./total no. (%)			
Controlled	89/100 (89.0)	—	
Uncontrolled	11/100 (11.0)	—	
COVID-19 (yes), no./total no. (%)	0/100 (0.0)	—	
Prevention measures, no./total no. (%)			
Stay at home	94/100 (94.0)	—	
Outside with masks and hand-washing	3/100 (3.0)	—	
Work with masks and hats, and hand-washing	3/100 (3.0)	—	

FENO, Fractional exhaled nitric oxide; *GINA*, Global Initiative for Asthma; *IQR*, interquartile range; *ppb*, parts per billion.
On the basis of response of Web/telephone interview, our previous asthma cohort was divided into 2 groups. Group 1, patients with asthma who were followed-up until April 29. Group 2, patients with asthma who were lost to follow-up during the outbreak. Asthma treatment referred to the stepwise approach in GINA. Subjects satisfying as least 1 criterion (FENO > 25 ppb, serum IgE > 100 IU/mL, blood-eosinophils > 0.3×10^9/L, sputum-eosinophil % > 3%, or positive allergen skin prick testing result) were defined as type 2 phenotype. Data were expressed as median (IQR) or no./total no. (%). *P* values comparing the 2 groups were from Pearson χ^2 test or Mann-Whitney *U* test. *P* values indicated differences between the 2 groups. $P < .05$ was considered statistically significant.