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 co-morbid 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

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)	—	

*F*ENO, 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 (*F*ENO > 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.

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

government, while the others went to work (3.0%) or public places (3.0%) with prevention measures including masks, hats, and frequent hand-washing. A conclusion we could speculate was that the differences in greater awareness of self-protection of patients with asthma, local prevention measures, and social prevention atmosphere might have contributed to differences in the prevalence of comorbid asthma in patients with COVID-19, with rates varying in some geographic areas.

Third, during the COVID-19 pandemic, residents with typical symptoms (eg, fever, cough, and dyspnea) were in the priority list of those undergoing nucleic acid test due to the limited testing capacity and medical resources. Asthma is a chronic airway disease, making patients with asthma more likely to present similar symptoms and undergo nucleic acid testing. Butler et al found that among 193 patients with COVID-19, 17 cases had coexisting asthma and 7 of these 17 (41.2%) patients had pneumonia; this rate, however, was significantly lower than the rates of pneumonia in COVID-19 reported from the United States and China (83.5%[2] and 71.1%,[4] respectively). Consequently, large-sample retrospective studies nationwide and on a worldwide scale are urgently needed (increasing research has been coming up) to capture the true prevalence of comorbid asthma in COVID-19 in the real world.

Finally, the level of angiotensin-converting enzyme-2 (ACE2), the cell entry receptor of severe acute respiratory syndrome coronavirus 2, was inversely associated with type 2 biomarkers.[5] Besides, IL-13, a type 2 cytokine strongly related to allergic asthma, could significantly reduce ACE2 expression in both nasal and bronchial epithelium.[6] However, a study about COVID-19–related genes in sputum cells in asthma identified that the use of inhaled corticosteroids was associated with a lower expression of ACE2,[7] indicating that inhaled corticosteroid treatment of asthma could potentially reduce the susceptibility of patients with asthma to COVID-19. Satisfying medicine adherence and high rate of type 2 inflammation phenotype (96 of 100 patients with asthma) could be one of the primary reasons that no investigated patient had COVID-19 in a small size of our asthma cohort.

In summary, information about COVID-19 coexisting asthma/allergic diseases remains scarce, and further studies regarding the association between asthma/type 2 immune response and the susceptibility to COVID-19 are required to reveal the mechanism of immune reaction in COVID-19.

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