cereals other than wheat. Augmentation factor–triggered food allergy has been proposed as a more appropriate term for this disease entity.[8] Moreover, equivalent syndromes to WDEIA but involving other cereals could exist and could be either specifically named or given the general term of *cereal-dependent exercise-induced anaphylaxis*, as recently proposed[10] in a case with specific IgE to wheat, rye, and barley.

In conclusion, we describe a patient with a strong in vitro sensitization to ω-5 gliadin and a positive skin prick test result to gliadin, which we consider important tests for the diagnoses and treatment of this type of patients, who experienced an initial anaphylactic reaction after eating rye and taking acetylsalicylic acid followed by physical exercise and, 2 years subsequently, experienced a generalized urticaria after eating wheat not followed by exercise.

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Determinants of asthma morbidity in World Trade Center rescue and recovery workers

Asthma is one the most common chronic conditions affecting World Trade Center (WTC) rescue and recovery workers in the aftermath of the terrorist attacks on September 11, 2001. Although exposure-response gradients between asthma risk and duration of work at the WTC site, exposure to the dust cloud, and work in the Ground Zero pit, compounded by inadequate protection, have been described,[1–3] there is limited knowledge about how exposure and other factors affect long-term asthma outcomes among WTC rescue and recovery workers. In this study, we used data from a cohort of WTC workers with a physician diagnosis of asthma to study factors associated with worse asthma control, acute asthma-related outpatient and inpatient resource use, and poor quality of life.

We collected data on asthma history, levels of WTC exposures (categorized based on established criteria),[4] and comorbidities from a prospective cohort of 218 WTC workers with physician-diagnosed asthma who were enrolled in the WTC Health Program. Structured clinical interviews assessed for posttraumatic stress disorder (PTSD) and major depression. A validated questionnaire was used to measure gastroesophageal reflux disease (GERD) symptoms.[5] Outcomes included asthma control,[6] self-report resource use, and quality of life.[6] We performed multiple regression analyses to identify factors associated with increased morbidity.

Asthma was well controlled in 63 WTC workers (29%), not well controlled in 60 (28%), and very poorly controlled in 95 (44%). More than one-third had an unscheduled asthma-related physician visit (67%), whereas 37 participants (17%) had inpatient asthma-related visits in the 12 months before study enrollment. More than half of patients (53%) had poor asthma-related quality of life.

Table 1 indicates that after adjustment for sociodemographic and health status variables, very poor asthma control was associated with increased age (odds ratio [OR], 1.89 per 10 years; 95% confidence interval [CI], 1.05–3.41), lower income (OR, 7.52; 95% CI, 2.56–22.08), high WTC exposure levels (OR, 5.19; 95% CI, 1.14–23.73), higher GERD scores (OR, 1.13; 95% CI, 1.06–1.20), and PTSD (OR, 3.44; 95% CI, 1.08–10.95).

Outpatient resource use was associated with intermediate WTC exposures (OR, 0.23; 95% CI, 0.08–0.71) and major depression (OR, 2.70; 95% CI, 1.01–7.21), whereas inpatient resource use was associated with higher GERD scores (OR, 1.06; 95% CI, 1.01–1.10) and PTSD (OR, 3.52; 95% CI, 1.30–9.48). Poor asthma quality of life was associated with lower income (OR, 3.58; 95% CI, 1.68–7.60), post-9/11 asthma (OR, 2.73; 95% CI, 1.09–6.86), and higher GERD scores (OR, 1.05; 95% CI, 1.01–1.09).

Our study revealed that WTC-related asthma is frequently poorly controlled and results in substantial impairment in quality of life. Furthermore, we found that lower income and physical and mental health comorbidities were independently associated with increased asthma morbidity in the WTC rescue and recovery worker populations. Our results highlight the medical needs of WTC workers with asthma and suggest potential targets for future interventions.

Our findings are consistent with a study conducted among members of the WTC Health Registry, encompassing both local residents and rescue and recovery workers, which found

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Table 1
Adjusted Analysis of Asthma Control, Outpatient or Inpatient Resource Use, and Quality of Life

Variable	All participants (N = 218)	OR (95% CI)				
		Very poor vs good asthma control	Poor vs good asthma control	Outpatient resource use	Inpatient resource use	Poor vs good asthma quality of life
Age, mean (SD), y[a]	52.9 (8.0)	1.89 (1.05–3.41)	1.10 (0.62–1.92)	1.04 (0.67–1.62)	0.77 (0.43–1.38)	1.23 (0.79–1.93)
Female sex, No. (%)	62 (28.4)	0.88 (0.33–2.38)	0.93 (0.35–2.48)	1.45 (0.67–3.17)	1.44 (0.56–3.68)	1.09 (0.50–2.36)
Race, No. (%)						
Non-Hispanic white	29 (13.4)	Reference	Reference	Reference	Reference	Reference
Non-Hispanic black	77 (35.7)	1.64 (0.43–6.24)	0.75 (0.20–2.85)	0.81 (0.28–2.32)	1.87 (0.50–6.98)	1.71 (0.59–4.97)
Hispanic	95 (44.0)	0.99 (0.35–2.77)	0.90 (0.34–2.40)	0.44 (0.19–1.02)	1.03 (0.34–3.10)	1.16 (0.52–2.59)
Other	15 (6.9)	1.61 (0.33–7.94)	0.84 (0.17–4.14)	0.52 (0.13–2.20)	0.69 (0.09–5.33)	1.49 (0.40–5.48)
Monthly income, No. (%)						
>$3,000	117 (53.4)	Reference	Reference	Reference	Reference	Reference
<$3,000	81 (37.0)	7.52 (2.56–22.08)	3.69 (1.26–10.80)	0.68 (0.30–1.52)	1.46 (0.54–3.93)	3.58 (1.68–7.60)
Unknown	21 (9.6)	1.64 (0.24–11.28)	1.77 (0.24–13.10)	0.98 (0.20–4.74)	0.95 (0.18–5.04)	1.97 (0.49–7.94)
Post-9/11 asthma, No. (%)	169 (81.6)	1.72 (0.55–5.39)	1.01 (0.36–2.84)	0.58 (0.23–1.41)	0.43 (0.14–1.35)	2.73 (1.09–6.86)
Atopy, No. (%)[b]	119 (54.3)	0.87 (0.36–2.13)	0.57 (0.24–1.36)	1.25 (0.61–2.55)	0.33 (0.13–0.84)	0.81 (0.41–1.60)
WTC exposure, No. (%)						
Low	27 (12.4)	Reference	Reference	Reference	Reference	Reference
Intermediate	98 (45.0)	4.04 (0.91–17.91)	3.62 (0.84–15.62)	0.23 (0.08–0.71)	0.38 (0.09–1.59)	2.26 (0.71–7.22)
High	93 (42.7)	5.19 (1.14–23.73)	2.42 (0.54–10.87)	1.05 (0.36–3.09)	1.31 (0.33–5.22)	2.09 (0.64–6.82)
Comorbidities, No. (%)						
GERD score[c]	9.4 (10.5)	1.13 (1.06–1.20)	1.07 (1.01–1.14)	1.04 (1.00–1.08)	1.06 (1.01–1.10)	1.05 (1.01–1.09)
Sinusitis[d]	135 (64.0)	0.81 (0.31–2.13)	0.65 (0.26–1.62)	1.06 (0.48–2.32)	1.19 (0.43–3.29)	0.70 (0.33–1.50)
Major depression[e]	35 (16.0)	1.33 (0.34–5.20)	0.60 (0.13–2.66)	2.70 (1.01–7.21)	0.82 (0.25–2.73)	2.05 (0.71–5.95)
PTSD[f]	61 (27.9)	3.44 (1.08–10.95)	1.86 (0.56–6.19)	1.50 (0.65–3.43)	3.52 (1.30–9.48)	1.99 (0.85–4.67)

Abbreviations: CI, confidence interval; GERD, gastroesophageal reflux disease; OR, odds ratio; PTSD, posttraumatic stress disorder; SCID, severe combined immunodeficiency.
[a]Per 10 years in adjusted analysis.
[b]IgE-validated indoor allergies.
[c]Validated GERD score.
[d]Self-reported.
[e]SCID-diagnosed major depression.
[f]SCID-diagnosed PTSD.

participants to have low levels of asthma control.[7] A potential reason for the high levels of asthma morbidity in WTC rescue and recovery workers is the high prevalence of comorbid GERD, estimated to affect almost 40% of WTC workers and identified as an important exacerbating factor in patients with poorly controlled asthma.[4] In addition, our finding of a strong association between PTSD and worse asthma morbidity in adjusted analysis is consistent with some community-based studies that reported associations between mental health comorbidities and poor asthma control.[8]

Post-9/11 asthma onset was associated with worse morbidity, suggesting more severe disease. Although it is possible that workers with pre-9/11 asthma were more likely to use respiratory protection and avoid high-exposure areas, our findings are consistent with research reporting that late-onset asthma is associated with a poorer response to standard asthma treatments and increased morbidity.[9] There is evidence of a distinct pathophysiologic signature associated with irritant-induced WTC-related asthma that is marked by increased sputum eosinophils and neutrophils,[10] elevated blood eosinophils, and persistent lower respiratory tract symptoms of cough, wheeze, dyspnea on exertion, and chest tightness.[11]

Another potential explanation for the relatively higher morbidity rates observed in our study is low adherence to asthma self-management behaviors. It is possible that some WTC workers with asthma are not adhering to inhaled corticosteroids or to other self-management behaviors, such as allergen avoidance, use of peak flow meters, and action plans, which are important for adequate asthma control.[12] Future studies are needed to examine whether these factors are important, and potentially modifiable, contributors to asthma morbidity in this population.

Our study was limited by reliance on self-report measures of several risk factors; however, we used validated scales to measure all study variables. In addition, although our 3-level measure of WTC exposure was based on established criteria based on self-report data,[4] no objective assessments have been developed to date. Moreover, our sample was limited to WTC rescue and recovery workers enrolled in the WTC Health Program. Thus, our results may not be generalizable to other WTC workers or other populations affected by the WTC disaster. Nonetheless, this study has a number of strengths, including its use of clinically validated mental health measures.

In summary, we found high levels of asthma morbidity among WTC rescue and recovery workers for 15 years after exposure. Our finding that GERD symptoms and PTSD are associated with worse asthma outcomes can help identify high-risk WTC workers and guide development of highly needed interventions.

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Racial/ethnic and socioeconomic differences in self-reported food allergy among food-sensitized children in National Health and Nutrition Examination Survey III

During the past several decades, self-reported food allergy (FA) has increased rapidly among all racial/ethnic groups in the United States, but it appears that this increase has been sharpest for non-Hispanic black children.[1] Although black children have much higher rates of sensitization to common foods than children of other race/ethnicities,[2] changes in food sensitization are unlikely to be the reason for the recent increase in FA, as documented by the recent finding that IgE sensitization to common foods did not increase among any racial/ethnic group from the early 1990s to the mid-2000s.[3] It is possible that black children who are food sensitized were historically less likely to report FA; however, to our knowledge, no population-based studies in the United States have directly examined this question. This study used a nationally representative sample (the National Health and Nutrition Examination Survey [NHANES] III) in which we recently measured food specific IgE (sIgE) to determine whether there were racial/ethnic and socioeconomic differences in the association between sensitization to common foods and self-reported FA.

Participants aged 6 to 19 years from NHANES III part 2 (1991–1994) were included. Frozen stored serum samples were recently analyzed for peanut, milk, egg, and shrimp sIgE by ImmunoCap as previously described.[3] Food sensitization was defined as peanut, milk, egg, or shrimp sIgE levels of 0.35 kU/L or higher. Self-reported FA was defined as a positive response to the following question: “Within an hour after eating something, has [the subject] ever had a severe reaction, such as itching all over, trouble breathing, flushing, hives, or swelling of the face or hands or feet?” Race/ethnicity was obtained by self-report and was categorized as non-Hispanic white, non-Hispanic black, and Mexican American. Household income was defined as the ratio of family income to the poverty threshold, as defined by the US Census Bureau, and a Poverty Income Ratio less than 1 was considered poor.

Overall, 2,673 children had sIgE measured and questionnaire data regarding food reactions (eTable 1). A total of 23.5% (95%

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