News Release

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Session A97: Mini-Symposium: COPD Susceptibility: Traffic, Temperature, and Tobacco. What To Target?
Sunday, May 18, 2014, 2:00 p.m. – 4:30 p.m.
Location: Room 4 (Upper Level), San Diego Convention Center

Higher Temperatures May Cause Greater Illness Among COPD Patients

ATS 2014, SAN DIEGO ─ If you suffer from COPD, staying cool this summer may provide much more significant benefits than simply feeling more comfortable. A study from researchers at Johns Hopkins University says it may also keep you healthier. The study found COPD patients who were exposed to warm indoor temperatures had greater disease-related morbidity, including an increase in symptoms, a rise in the use of rescue medications and a decline in lung function. Higher outdoor temperatures were also associated with increased COPD symptoms.

The study's results have important implications for the treatment of COPD as the climate gradually becomes warmer, the researchers said.

The study was presented at the 2014 American Thoracic Society International Conference.

"Understanding the effect of heat on susceptible populations is increasingly important in order to anticipate and prepare for health effects related to climate change," said study lead author Meredith McCormack, M.D., MHS. "Although outdoor heat has been associated with increased mortality and with hospitalizations in specific populations, including COPD, less is known about individual-level exposure to heat and the impact on disease-specific outcomes. That was the focus of our study."

The study included 84 former smokers with moderate to severe COPD who each underwent three week-long observation periods spaced three months apart. During these periods, daily in-home

and outdoor temperature monitoring was performed and study participants completed daily assessments of their COPD symptoms, measuring their breathlessness, cough and sputum production, their lung function, and their need for rescue inhaler medications. To study the effects of heat, investigators looked at the time spent in the warm season, which they defined as the time between the first and last day when temperatures exceeded 90°F in the city of Baltimore, the study's locale. The study included a total of 602 days of monitoring during the warm season, and patients reported going outdoors on only 48% of those days.

At the end of the study period, the researchers found that increases in indoor temperature were associated with increases in symptoms and rescue medication use and decreases in lung function. While the study participants spent little time outdoors, on days when some time was spent outdoors, increases in outdoor temperature were associated with increases in symptoms, but they did not affect medication use or lung function. These health effects of heat remained even after accounting for air pollution concentrations.

"These findings support the need for adaptive approaches to COPD treatment to prevent adverse health effects related to increases in temperature," McCormack said.

"Future work is needed to understand the mechanism by which heat impacts individuals with COPD and to identify the most effective intervention strategies," she added. "The need for novel approaches is especially critical in the face of anticipated climate change."

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** Please note that numbers in this release may differ slightly from those in the abstract. Many of these investigations are ongoing; the release represents the most up-to-date data available at press time.*

Abstract 56218

Indoor And Outdoor Heat Exposure Is Associated With Increased COPD Morbidity

Type: Scientific Abstract

Category: 06.03 - COPD: Epidemiology (CP/EOH)

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Abstract Body

RATIONALE: Understanding the effect of heat on susceptible populations is increasingly important to anticipate health effects related to climate change. Outdoor heat has been associated with increased mortality and increases in COPD hospitalizations in population

studies. Less is known about individual-level exposure to heat and the impact on disease-specific outcomes. We sought to investigate the effect of heat exposure on symptoms, lung function, and rescue medication use in a cohort of former smokers with COPD.

METHODS:Former smokers with moderate-severe COPD underwent week-long observation periods at baseline, 3 and 6 months. Daily in-home and outdoor temperature monitoring was performed and participants simultaneously completed daily assessment of symptoms
(Breathlessness, Cough and Sputum Scale (BCSS)), rescue inhaler
use, and lung function (PiKO device). Visits during the warm season, defined as the first through last day with a maximum outdoor temperature >90 F, were included. Random effects modeling analysis was used and models were adjusted for age, sex, education, and FEV_1% predicted or pack-years, as appropriate.

RESULTS: Subjects with COPD (n=84) were older (69$\pm$7 years), Caucasian (88%), male (58%), former smokers (57 $\pm$ 29 pack-years) with moderate-severe COPD (baseline FEV_1 49$\pm$16 % predicted, FEV_1/FVC 51$\pm$10 %). Participant had 602 days of monitoring during the warm season and reported going outdoors 48% of days (average outdoor time 2.0 $\pm$ 2.1hours on these days). Increases in indoor temperature were associated with increases in symptoms and rescue medication use and decreases in lung function (Table). Among days participants went outdoors, increases in maximum temperature were associated with increases in symptoms (BCSS β=0.37, p<001 per 10ºF increase) and there was no relationship on days when participants did not go outdoors (β=-0.02, p=0.81; p-value interaction= 0.07). Outdoor temperature was not associated with medication use or lung function.

CONCLUSIONS: Increasing indoor temperature was associated with disease-specific indicators of COPD morbidity, including increased symptoms, increased rescue medication use, and decreased lung
function. Although participants spent most of their time indoors, outdoor temperature was associated with increased symptoms on
days participants went outdoors. The findings of clinically significant changes in disease-specific indicators of COPD morbidity support the need for adaptive approaches to protect such individuals from adverse respiratory health effects of heat exposure which are projected to
increase with the anticipated course of climate change.

Effect of Increases in maximum indoor temperature on COPD morbidity			
Outcomes	**Coefficient**	**p-value**	**Confidence Interval**
BCSS	0.49	<0.01	(0.16,0.80)
Rescue Inhaler use	0.40	<0.01	(0.22, 0.59)
evening FEV_1	-0.06	<0.01	(-0.11, -0.02)
* per 10°F increase in maximum daily indoor temperature			