cliantha Science Integrity
Allergy Asthma Proc. 2012 Jul-Aug;33(4):333-40. doi: 10.2500/aap.2012.33.3579. Epub 2012 Jul 3.

Provocation of nonallergic rhinitis subjects in response to simulated weather conditions using an environmental exposure chamber model.

Bernstein JA[1], Salapatek AM, Lee JS, Nelson V, Wilson D, D'Angelo P, Tsitoura D, Murdoch R, Patel D.

Abstract

Nonallergic rhinitis (NAR) subjects present clinically with similar symptoms to subjects with allergic rhinitis, but which mechanistically are not IgE- mediated. NAR is difficult to study because of multiple, as yet unknown, disease mechanisms and lack of biomarkers and diagnostic tests. The purpose of this proof of concept pilot study was to develop an environmental exposure chamber (EEC) model to simulate weatherconditions in a controlled setting to objectively diagnose NAR subjects and ultimately to investigate novel NAR therapies. Thirty-seven subjects with a history of NAR confirmed by negative skin-prick test to a panel of aeroallergens were tested with cold dry air (CDA) and temperature change challenges. Objective (acoustic rhinometry [AcR] and nasal secretions) and subjective measures (total nasal symptom scores [TNSSs]: congestion, rhinorrhea, and postnasal drip [0-3]) were collected. Data was presented as mean ± SEM and statistical significance was assessed by paired t-test. The NAR EEC AcR responders to CDA had a significant decrease in mean minimal cross-sectional area (MCA; a measure of nasal patency) of 22.2 ± 2.43% ($p < 0.0001$) and 6.7 ± 7.22% (not statistically significant) at 30 and 60 minutes, respectively, with a concomitant increase in TNSS of 1.0 ± 0.24 U and 1.4 ± 0.30 U, respectively. AcR responders to temperature change showed a significant decrease in mean MCA to warm air of 16.0 ± 3.82% ($p < 0.001$) and 19.4 ± 3.88% ($p < 0.0001$) at 30 and 60 minutes, respectively, with an increase of TNSS of 0.4 ± 0.25 U and 0.4 ± 0.27 U, respectively. With rapid conversion to cold air, further decrease in mean MCA accompanied by an increase in TNSS was observed at 30 and 60 minutes. Increase in rhinorrhea was highest for CDA and the cold air phase of the temperature change challenge. Using the NAR EEC model, significant symptoms were induced in response to simulated weather changes in NAR patient responders. This proof of concept pilot study shows that the EEC model provides a consistent and reliable method to phenotype weather-induced NAR subjects that could be used to investigate disease mechanisms and novel therapies for NAR.