

September 2014

Environment Plays Bigger Role than Genetics in Food Allergic Disease Eosinophilic Esophagitis

CINCINNATI - Researchers have identified that environment has a much stronger role than genetics in eosinophilic esophagitis (EoE), a severe, often painful food allergy that renders children unable to eat a wide variety of foods.

Eosinophils are normal cellular components of the blood, but when the body produces too many eosinophils they can cause a variety of eosinophilic disorders. These are disorders involving chronic inflammation and resulting in tissue damage, often in the gastrointestinal system.

In an international collaboration involving multiple institutions, researchers at Cincinnati Children's Hospital Medical Center quantified the risk associated with genes and environment on familial clustering of EoE.

The researchers constructed and examined patient family pedigrees of patients with EoE and their first-degree relatives (nuclear family analysis) and of patients with EoE and their identical or fraternal twin/triplets (twin analysis). Using these two distinct analyses, they determined that 2.4% of siblings and 1.8% of first-degree relatives of patients with EoE also had EoE.

The researcher also found that brothers, fathers, and males were more likely to have EoE than sisters, mothers, or females. Twins had 20-40% risk of EoE depending upon whether they were identical or fraternal.

“The power of this study is the twin analysis,” says Eileen Alexander, PhD, MS, BSN, RN, Woodside Fellow at Cincinnati Children's and first author of the study. “Both the twin and family analyses support that genetics contribute to EoE risk, but the twin analysis revealed that the contribution of genetics was previously overestimated, masking the stronger contribution of common household environment. Further studies of environmental factors may identify modifiable environmental risk factors that could be targeted for EoE prevention.”

This study, published online September 22 in *Journal of Allergy and Clinical Immunology*, is the first EoE heritability study to analyze twins. This is a necessary step in separating the contribution of genetics from environment. It also identified a few environmental risk factors, including food allergies, high twin birth-weight difference, and self-reported penicillin allergy.

Allergic diseases have been on the rise over the past 20 years, with approximately one of every 13 children having food allergies and over 2.5 million children suffering from allergic asthma. Only recently recognized as a distinct condition, the incidence of EoE has also been increasing. Dr. Marc E. Rothenberg M.D., Director of the Division of Allergy and Immunology and Cincinnati Center for Eosinophilic Disorders, and his laboratory team pioneered research showing EoE's reported incidence is estimated to be approximately 1 out of 1,000 people. Its hallmark is swelling and inflammation in the esophagus, accompanied by high levels of immune

cells called eosinophils.

EoE can affect people of any age, but is more common among young men who have a history of other allergic diseases, such as asthma and eczema. EoE is often first discovered in children with feeding difficulties and failure to thrive, but it is often misunderstood and not well known, delaying proper diagnosis and treatment.

Funding support for the study came from the Frank C. Woodside, Dinsmore & Shohl Fellowship (Cincinnati Children's Division of Biostatistics and Epidemiology), University of Cincinnati Research Council, Campaign Urging Research for Eosinophilic Disease (CURED), Food Allergy Research and Education (FARE), Buckeye Foundation; and National Institutes of Health (T32-ES10957 Molecular Epidemiology in Children's Environmental Health Fellowship 2011-2013; NIEHS P30-ES006096 Center for Environmental Genetics New Investigator Scholar and PI Mentee/Mentor; NIH 8 UL1-TR000077-04 Center for Clinical and Translational Science and Training, CTSA, NCATS Just in Time; CCTST REDCap UL1-RR026314-01 NCRR/NIH; 1R25GM093044-01 UAB Section on Statistical Genetics; NIH-1K24DK100303).

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