

Genetic predisposition increases childhood asthma risk

August 21 2007

Children who carry variations in specific genes that metabolize vehicle emissions are more susceptible to developing asthma, particularly if they live near major roadways, a study led by researchers at the University of Southern California (USC) suggests.

Researchers found that children who carried variations in two genes and lived within 75 meters of a major road were up to nine times more likely to develop asthma than children who lived further away, says Muhammad T. Salam, Ph.D. candidate at the Keck School of Medicine of USC, and the study's lead author. The study will appear in the journal *Thorax*, and is now available online.

“This is one of the first studies to report that children with certain genetic backgrounds are even more susceptible to asthma than if they lived near major roads and did not carry the variations,” Salam says. “We are working to understand how traffic-related exposures may interact with these genes, leading to asthma development.”

Asthma is the most common chronic disease in children, and previous studies have shown that traffic-related pollution near the home increases asthma risk and reduces lung growth, according to USC experts.

Researchers drew upon data from the Children's Health Study (CHS), a longitudinal study of respiratory health among school-age children in 12 Southern California communities. They compared associations between number of genetic variants and exposure to toxins among more than

3,000 study participants.

Researchers found that high levels of microsomal epoxide hydrolase (EPHX1)—an enzyme that metabolizes polyaromatic hydrocarbons (PAH) in vehicle emissions—was associated with an increased risk for lifetime asthma. Children with high EPHX1 levels who also carried variations in glutathione S-transferase P1 (GSTP1) genes were four times more likely to have asthma.

Among children who lived within 75 meters of a major road, those with high EPHX1 activity were three times more likely to have asthma than those with lower activity. Children who carried both variations and lived within 75 meters of a major road were at the highest asthma risk. The results were consistent for current, early and late onset asthma.

"This finding demonstrates the critical role of gene environment interaction in determining disease susceptibility," says David A. Schwartz, M.D., director of the National Institute of Environmental Health Sciences. "The investigators at USC have identified key genetic variations in biological pathways related to PAH metabolism that are associated with the occurrence of asthma in children who live in close proximity to traffic."

Approximately 12 percent of children in the study carried both of the variations and three percent were in the highest risk group based on where they lived. However, there are a number of genes that could be linked with asthma, and researchers are just beginning to study the associations between genes and environmental factors, Salam says.

"It is difficult to say that if parents with an asthmatic child move further from busy streets, the child will definitely have fewer symptoms," he explains. "All that can be said at this moment is that data from this and other studies show strong evidence that living near heavy traffic

increases asthma risks and exacerbates symptoms in children who already have asthma.”

Source: University of Southern California

Citation: Genetic predisposition increases childhood asthma risk (2007, August 21) retrieved 18 April 2024 from <https://medicalxpress.com/news/2007-08-genetic-predisposition-childhood-asthma.html>

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