Center for ecogenetics & Environmental Health

Fast Facts about:

Childhood Asthma & the Environment

What is asthma?

Asthma is a chronic (long-term) lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing (a whistling sound when you breathe), chest tightness, shortness of breath, and coughing. Without treatment, someone having an asthma attack can end up in the emergency room or even be hospitalized. Asthma can be life threatening if not properly managed.

What Causes an Asthma Attack?

An asthma attack or exacerbation is a series of events that promotes swelling of the lung lining, tightening of the muscles around airways, and increased mucus in the airways. In people with asthma, the airways are predisposed to being inflamed and sensitive to various external factors or "triggers." Coming into contact with these factors "triggers" the asthma response. Not everyone with asthma has the same triggers.

Asthma triggers include:

- Respiratory infections (e.g. "common cold")
- Allergens (pollen, mold spores, pet dander, feathers, dust, dust mites, cockroaches)
- Indoor pollutants (perfume, cleaning solutions, tobacco smoke, or other irritant gases)
- Outdoor air pollutants (ozone, particle pollution, smoke from burning wood or grass)
- Cigarette smoke and secondhand smoke
- Changes in outdoor temperature or humidity, cold air
- Exercise

Do more children have asthma now?

Asthma is one of the most common chronic diseases of children, affecting 7.1 million children in the US. The condition is increasingly prevalent among children. According to the Centers for Disease Control, the rate of childhood asthma has more than doubled since 1980, and now nearly 1 in 10 American children has asthma. The American Lung Association reports that 106,000 kids in Washington State have asthma. Scientists have identified multiple risk factors that may play a role.

Is Childhood Asthma linked to the Environment?

Yes. Both indoor and outdoor air pollution can trigger an asthma attack and research is beginning to link early life exposure to some pollutants and the development of asthma. Cockroach allergen, furry pets, inhaled mold, secondhand smoke, and dust mites are common asthma triggers indoors. Outdoor air pollution comes from factories, cars, and other sources such as woodsmoke.

High traffic such as from freeways increases pollutants up to 500 feet from the roadway. Kids with higher traffic exposure have more and worse respiratory infections, they miss school, and parents have to miss work. Asthma is one of the leading causes of school absence.

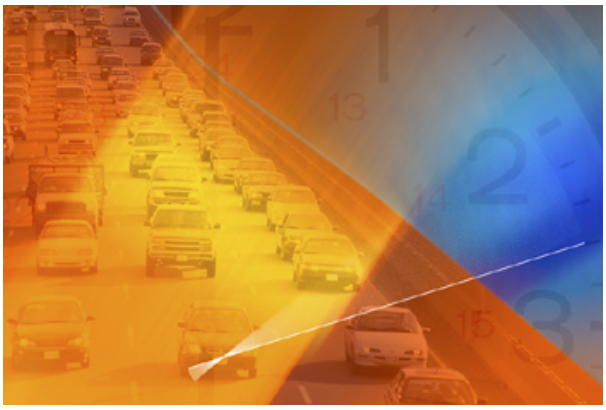
What are researchers working on?

Here are examples of research by scientists in the Center for Ecogenetics & Environmental Health:

1) Dr. Catherine Karr participated in research to study the effect of being exposed to air pollution in utero and up to age one, on the risk of being diagnosed with asthma. The research was published in a paper titled *Effect of early life exposure to air pollution on development of childhood asthma.*

From the medical records of 37,000 children born in British Columbia in 1999 & 2000, her group found 3,482 (9%) had asthma by age 4 years. They found a statistically significant increased risk of asthma diagnosis in children with increased exposure to carbon monoxide, nitric oxides NO and NO_2, particulate matter (PM), sulfur dioxide, and black

carbon. Traffic-related pollutants were associated with the highest risks. The findings support the hypothesis that early childhood exposure to air pollutants plays a role in developing asthma. (Environmental Health Perspective. 2010 Feb;118(2):284-90.)



2) Dr. Joel Kaufman and colleagues researched whether increased exposure to particulate matter air pollution (PM) was associated with lower pulmonary function in adults with chronic obstructive pulmonary disease (COPD) or children with asthma. They followed 57 adults with and without COPD and 17 children aged 6 to 13 years with physician-diagnosed asthma in Seattle over the 3-year study.

In children who were not taking anti-inflammatory medication, being exposed to fine particulate matter ($PM_{2.5}$) was associated with lower results on pulmonary function tests. Children who used anti-inflammatory asthma medication were affected significantly less by the exposure. (Chest. 2006 Jun;129(6):1614-22).

3) Little research exists about the health effects of air pollution in agricultural settings. Dr. Karr is investigating the causes and effects of air pollution in Yakima County, a highly productive farming region in eastern Washington. This follow up study involved 58 children with asthma; nearly all were Hispanic and median household income was less than $30,000. Karr and her colleagues collected data on community air concentrations of fine particulate matter ($PM_{2.5}$) and residential air samples that measured ammonia. Health data on the children's lung function and symptoms was collected over two years.

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The study found evidence of more asthma symptoms and worse lung function after higher air pollution days. Over the follow up period, children reported overall fewer symptoms. Dr. Karr feels this reflects the study's community health worker's involvement educating families about how to manage the disease.

Food for Thought

Do you think children from low-income families are more likely to have asthma? If yes, what are some possible reasons for this?

Can you suggest a change in public policy that would reduce asthma triggers in the environment?

Can you think of something you can do to reduce asthma triggers in your living space? Something you can do to reduce outdoor air pollution?

What other research should be done to understand the environmental causes of childhood asthma?

Where to learn more

American Lung Association
http://www.lung.org/lung-disease/asthma/resources/facts-and-figures/asthma-children-fact-sheet.html

National Institutes of Health, Asthma
http://www.nhlbi.nih.gov/health/health-topics/topics/asthma

NIH Asthma Factsheet:
http://www.nhlbi.nih.gov/files/docs/public/lung/asthma_atglance.pdf

US Centers for Disease Control
http://www.cdc.gov/asthma/

Environmental Protection Agency *Recipes for Healthy Kids: Breathing Easy* curriculum
http://www2.epa.gov/children/childrens-health-curriculum-lesson-3-breathing-easy-keeping-inside-our-homes-healthy-and

Northwest and national Pediatric Environmental Health Specialty Units (PEHSU)
http://depts.washington.edu/pehsu/partner
http://www.pehsu.net/about_resources.html

Dr. Catherine Karr's research on health effects of air pollution in an agricultural setting:
http://hsnewsbeat.uw.edu/story/pollutants-differ-farm-still-play-role-asthma