

Congressional Briefing
September 25, 2012

Human Health Effects of Biomass Incinerators:

**A Pediatrician's Perspective on Air Pollution
and Children, with a Focus on Inflammation**

Norma Schue Kreilein, MD, FAAP
Daviness Community Hospital
Washington, Indiana

For crying out loud, when are we gonna learn. . .
We can't breathe what we burn.

J. Bruce Liles, Jasper, Indiana

Education and Credentials

University of Notre Dame, BS Preprofessional Studies with Honors 1982

Indiana University School of Medicine 1986

Los Angeles County/USC Medical Center

Internship & Residency in Pediatrics 1986-89

Diplomate, American Board of Pediatrics 1989

Recertified 1996 & 2003, Maintenance of Certification current 2012

Fellow, American Academy of Pediatrics

Professional Experience

Private Practice Jasper, Indiana -- 1989-2012

Memorial Hospital & Health Care Center -- currently courtesy staff

Board of Directors – 1992-1994, 2001

Medical Staff President – 1994, 2001

Medical Staff Vice President – 2000

Primary Care Chairman – 1991-1993

Credentials Committee Chairman – 1998, 2006-2007

Nursery/Pediatrics Department Chairman --1990, 1995, 1997, 2009

Private Practice Washington, Indiana -- July 2012

Grand Avenue Pediatrics of Daviess Community Hospital

Clinical Associate Professor of Pediatrics

Indiana University School of Medicine

Volunteer Teaching Junior and Senior Year Outpatient Pediatrics

Where I Come From

Norman & Leona Kitten Schue Farm

The Kitten family homestead since 1852

~200 acres near Ferdinand, Indiana

Farmhouse c. 1860 -- 8 kids --1bathroom

Dad earned **2010 Dubois County & 2011 Indiana Soil and Water Conservation Farmer of the Year**

14 years Boy Scouting --2 Eagle Scouts





Severe, Visible Air Pollution Where I Live and Work

- **Photo I took** – 07:56 am Sept 6, 2012, between Otwell and Washington, Indiana. The air pollution covers my region.
- **MY PATIENTS BREATHE IN THIS AIR POLLUTION**
- Monitors do not adequately protect children since exposure has already occurred.

More Pollution EQUALS More Patients



- Older sister coughing and sore throat since last pm; Mom asks “Why?”
- Mom worried about 5 wk old with Tetralogy of Fallot (blue baby heart defect; ozone pollution increases risk)
- Mennonite family self pay
- Mom buys **either** \$200 of pulmicort for the cough or oral steroids for \$30
- Strep antibiotic \$5.00
- **Air** pollution further **increases** cost of care and **shortens** the baby’s life

**And EACH PATIENT is a real person in a real family,
NOT just a diagnosis, statistic, or cost liability.**

American Lung Association Opposes Biomass Incinerators



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Treasurer

Albert J. Rizzo, MD
Nationwide Assembly
Speaker

June 24, 2009

The Honorable Henry A. Waxman
Chairman
House Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

The Honorable Edward J. Markey
Chairman, Subcommittee on Energy and the Environment
House Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Chairman Waxman and Chairman Markey:

As you consider legislation to address global climate change and energy policy, the American Lung Association urges you to use this opportunity to target widespread pollutants that can both directly harm lung health of millions of Americans and worsen global climate change. At a minimum, we urge you to select mechanisms that prevent increases in ambient air pollution and hazardous air pollutants.

Over 186 million Americans continue to live and breathe in areas with unhealthy air in the United States. The American Lung Association supports aggressive strategies to reduce greenhouse gas emissions that maximize co-benefits of reducing criteria pollutants and provide near-term public health benefits. These strategies include ambitious programs to reduce the country's dependence on fossil fuel combustion and promote cleaner alternative vehicle technologies and fuels. These require real changes: substantial increases in clean renewable energy resources; a transformation of the land use planning process to emphasize smart growth policies that promote alternatives to driving; and, as well, significant reductions in power plant and industrial emissions.

We urge you to consider approaches that target two critical two critical pollutants well within reach—black carbon and ozone. Black carbon, or diesel soot, and ozone not only significantly impact global warming but also endanger public health. Black carbon from diesel, a mixture of 40 different toxic substances, increases the risk of developing lung cancer. Ozone, the most commonly encountered pollutant in America's cities, damages lung capacity and aggravates asthma. Both pollutants send people with asthma and other chronic lung diseases to the hospital and emergency room. Both cut short the lives of thousands of people every year. Because black carbon particles and ozone have significantly shorter life-spans in the atmosphere than carbon dioxide, immediate controls can make a near-term difference in the level of global warming, as well as have immediate health benefits.

Chairman Waxman and Chairman Markey
June 24, 2009
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The legislation should support state and local air pollution control efforts and include strong controls on major sources of emissions. Please include stronger controls on coal-fired power plants and other major industrial sources that also reduce sulfur dioxide, nitrogen oxides, mercury and other toxic air contaminant emissions.

The legislation should promote clean renewable electricity, including wind, solar and geothermal. The Lung Association urges that the legislation not promote the combustion of biomass. Burning biomass could lead to significant increases in emissions of nitrogen oxides, particulate matter and sulfur dioxide and have severe impacts on the health of children, older adults, and people with lung diseases.

The American Lung Association thanks you for the opportunity to share our perspective.

Sincerely,

Charles D. Connor
President & CEO

“The Lung Association urges that the legislation not promote the combustion of biomass. Burning biomass could lead to significant increases in emissions of nitrogen oxides, particulate matter and sulfur dioxide, and have severe impacts on the health of children, older adults, and people with lung diseases.”

Biomass Incineration Produces **AIR POLLUTION**

- Biomass burning **produces air pollution.**
- Air pollution **triggers inflammation.**
- Inflammation is **responsible for disease.**
- Disease from air pollution is **difficult to treat.**
- Treatment is **expensive.**
 - Children often miss school, activities & life opportunities.
 - Parent often misses work to care for sick children.
 - Many can't pay medical costs.

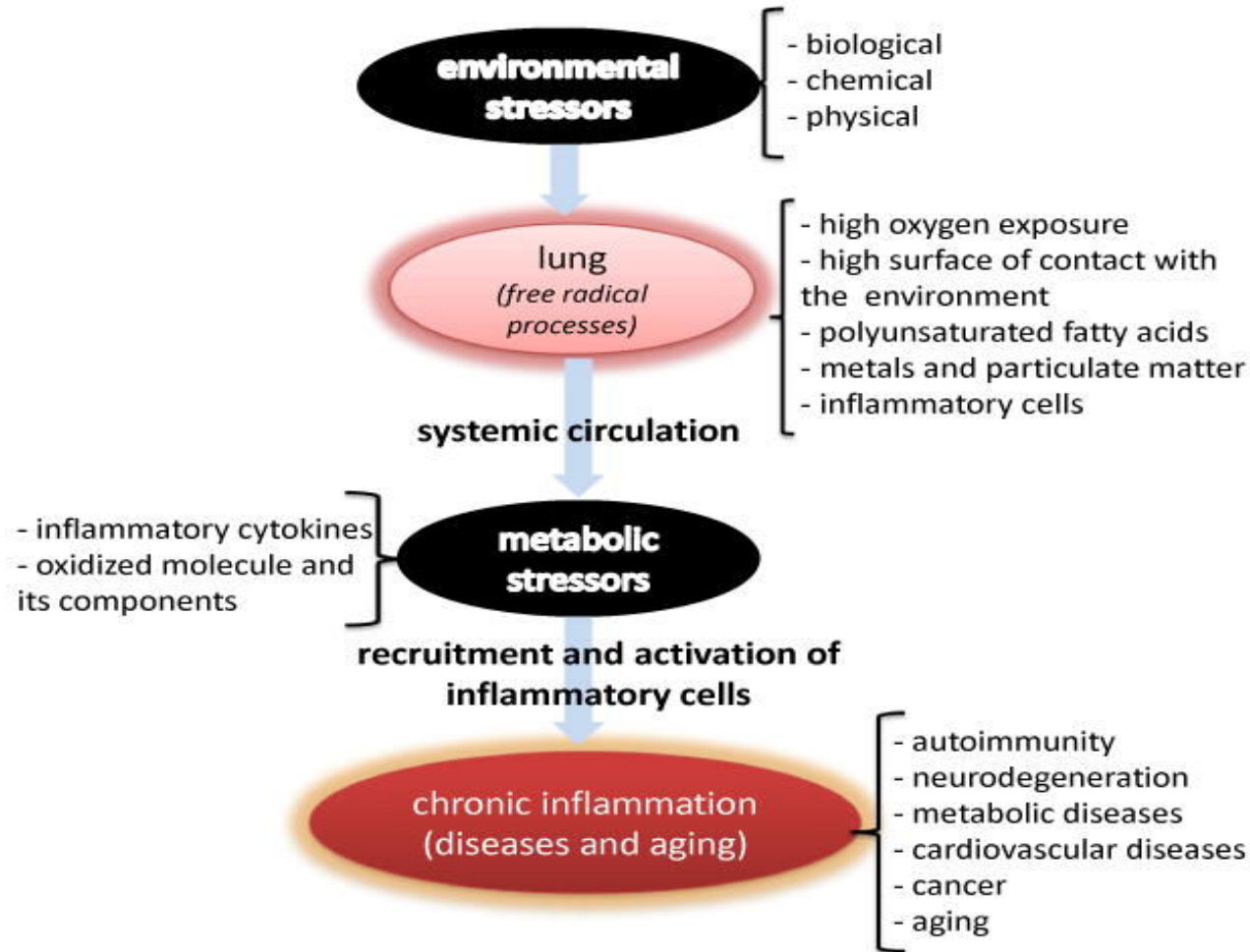
Inflammation Is a Disease Process

- Inflammation is a **primary immune response** to a trigger.
- Inflammation **becomes** a disease when the trigger, air pollution, doesn't go away.
- Inflammation is a **CASCADE**, not a tightly regulated feedback loop compared to other body processes.

Air Pollution Causes Disease by Triggering Inflammation

- **Particulate pollution is a potent inflammatory trigger.**
- **Both acute and chronic inflammation cause damage and play critical roles in many disease processes by stimulating clot and scar formation.**
- **DISEASE RISK and DAMAGE CAUSED are DOSE RELATED TO POLLUTANT LEVELS and worsen or become irreversible with *severe acute* or *chronic ongoing* exposure.**

How a Pollutant Becomes a Chronic Disease



Mutat Res. 2009 March 31; 674(1-2): 62–72.

Published online 2008 October 11. doi: 10.1016/j.mrgentox.2008.09.016

Special Pediatric Considerations

- Kids spend time outside and breathe in **more** air pollutants per pound of body weight.
- Children's barriers less effective--lung, skin
- Child's cumulative lifetime exposure
 - Affects child's DEVELOPING body especially lungs, brain, and immune system.
 - Affects child's family and future.

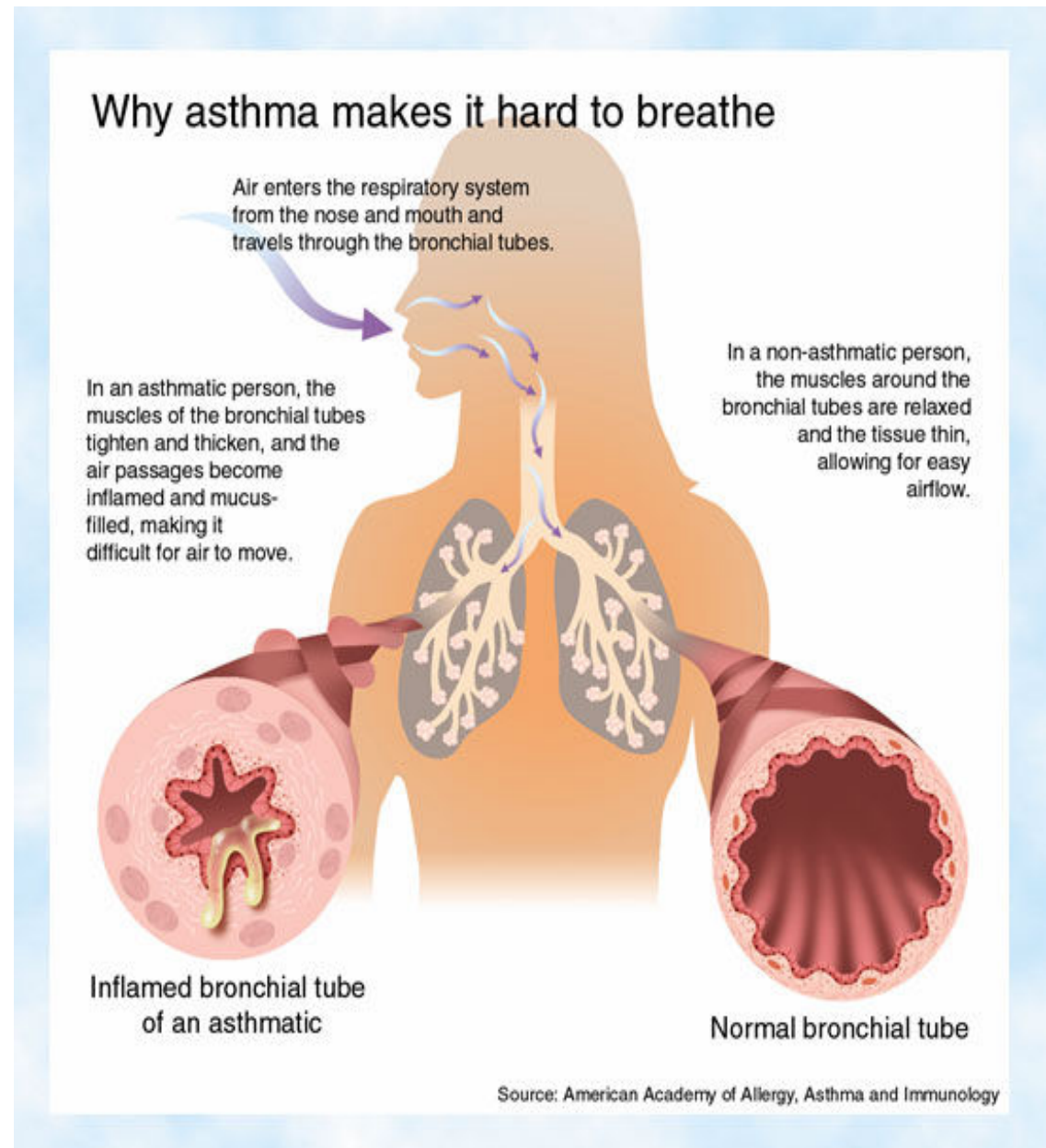
Acute vs. Chronic Diseases

- Modern medicine effective at treating trauma, infections, and **preventing** disease with vaccines and public health initiatives
- Medicine **NOT EFFECTIVE** at “curing” **chronic diseases** caused by **ONGOING POLLUTION**
- Only in past 20 years beginning to understand the role of inflammation in chronic disease progression and pollution as its trigger.
- **Chronic** = Progressive, expensive, devastating

Progression of Airway Disease from Pollutants

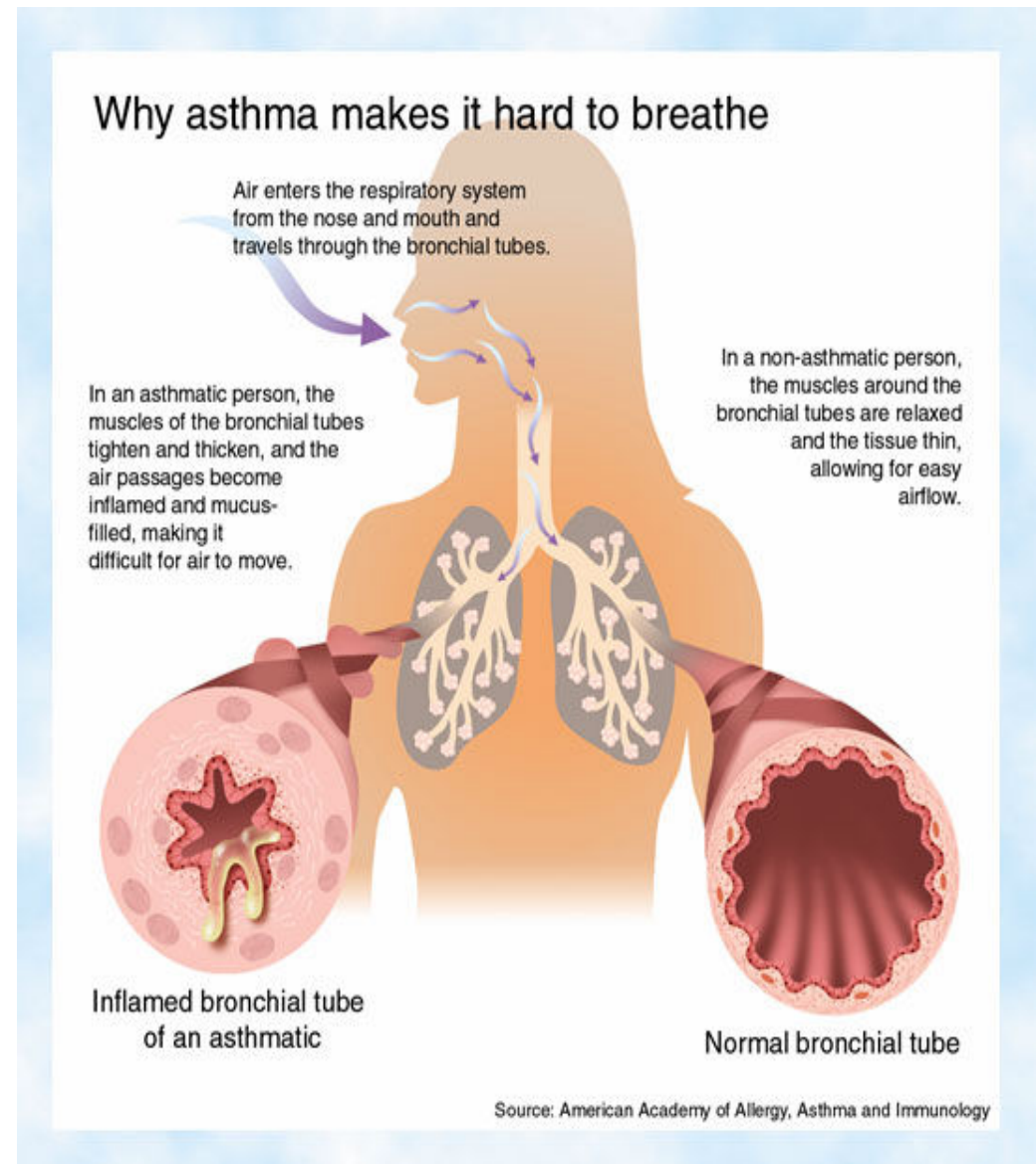
ASTHMA

- **Bronchial muscle spasm constricts airways.**
- Inflammation causes **airway swelling and MORE mucus** limiting air flow and clearance.



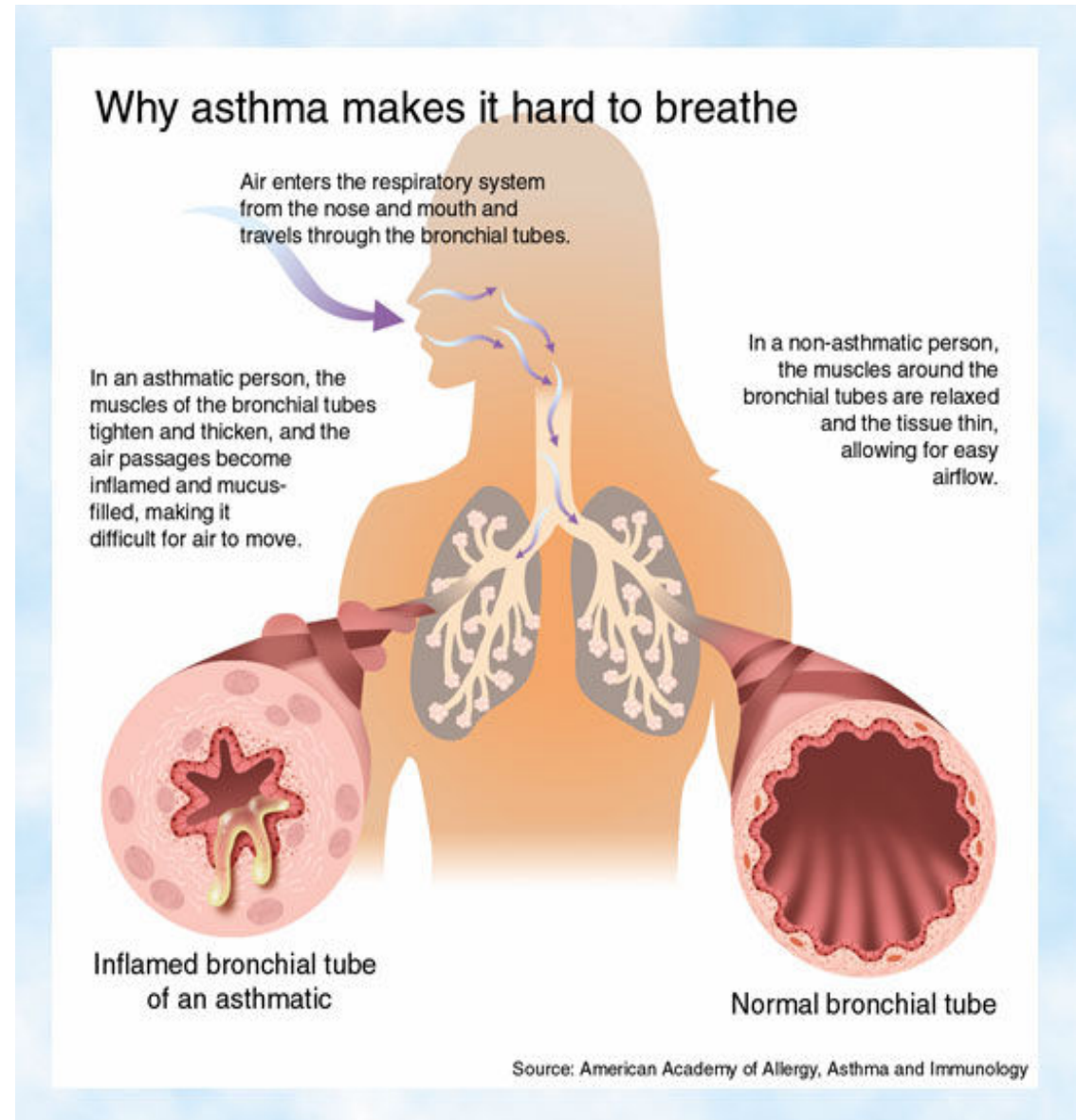
Progression of Airway Disease from Pollutants

- Long term **epithelial injury triggers irreversible scarring (AIRWAY REMODELING)**.
- Pollutants also **damage cilia, reducing clearance.**



Progression of Airway Disease from Pollutants

- Hagen-Poiseuille equation states **air flow \sim radius⁴**.
- Kids' airways smaller so any **swelling is more significant to airflow and clearance**

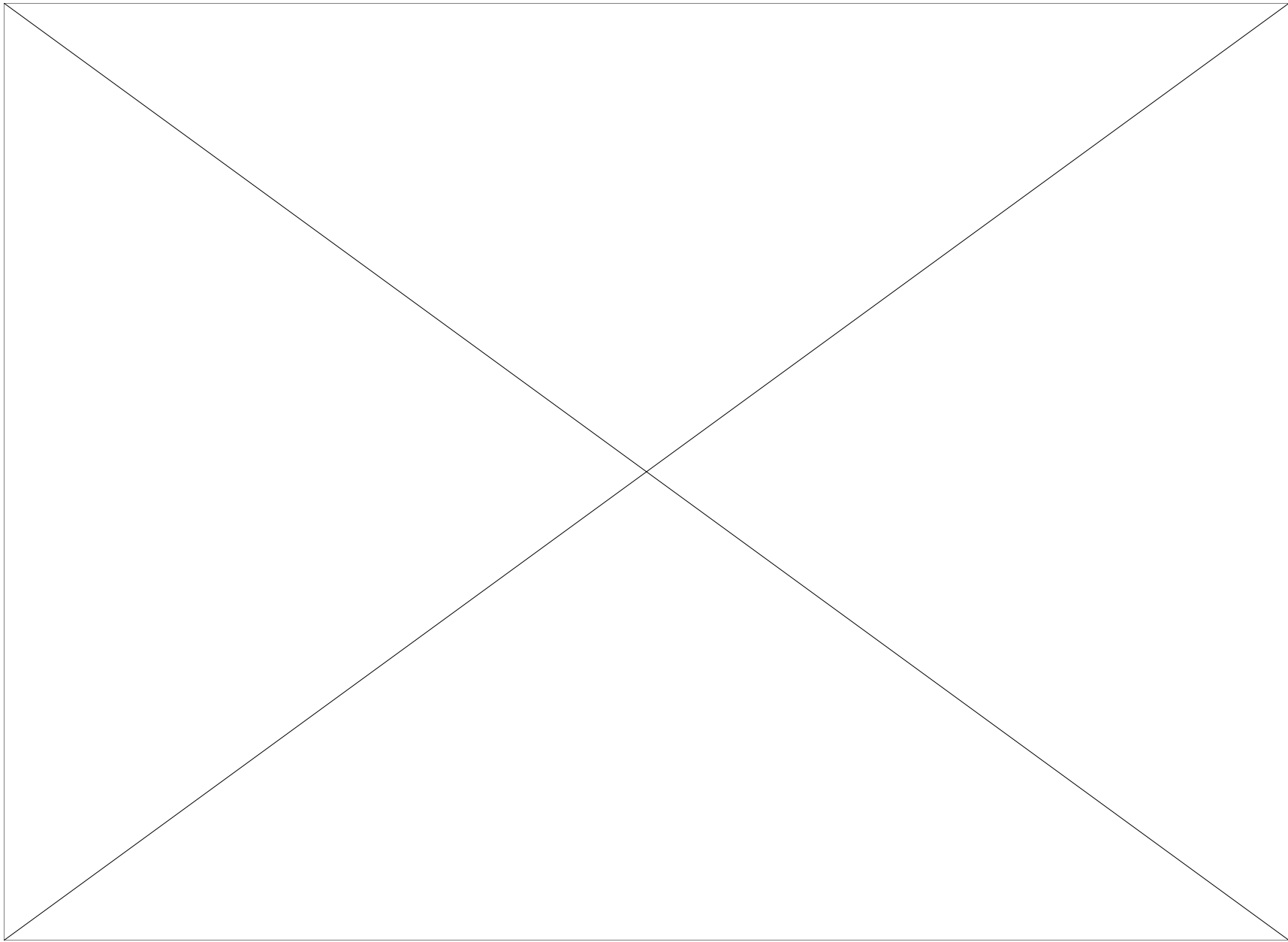


Limitations of Asthma Treatment

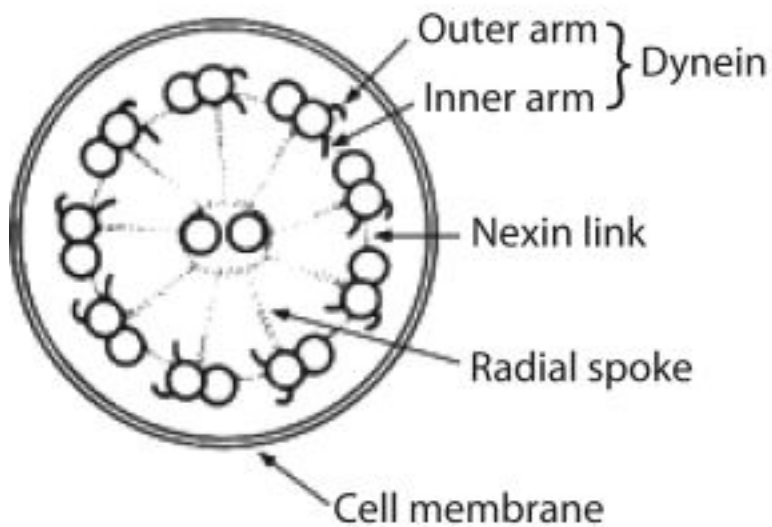
- ALBUTEROL relaxes bronchial muscle spasm.
 - Provides temporary relief only
 - Side effects are frequent.
- STEROIDS treat inflammation.
 - Inhaled steroids SAFER but weaker & **EXPENSIVE.**
 - Systemic steroids treat and affect the **WHOLE BODY.**
 - Oral steroids and steroid shots cheap
 - IV steroids part of expensive hospitalization
 - **SIDE EFFECTS are FREQUENT.**

Vicious Cycle

- Deciding when to start or stop inhaled steroids
 - Can't **directly** measure or feel amount of inflammation
 - The trigger (**AIR POLLUTION**) is ongoing.
- Many families **CAN'T AFFORD** the inhalers (\$40-200/mo), tests, or doctor visits.
- Chronic ongoing inflammation leads to irreversible **AIRWAY REMODELING**.



Normal Healthy Cilia Line Airways

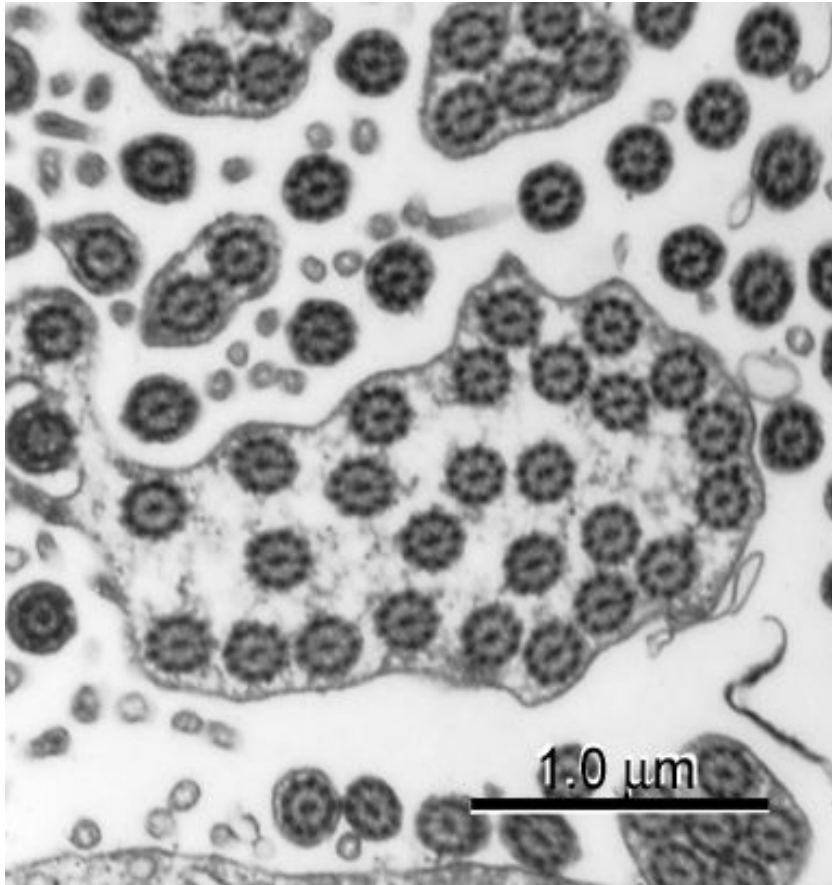


Cross Sectional View of Normal Cilia

From [Paediatric Child Health. 2008 October; 13\(8\): 672–674.](#)

Inhaled Pollutants Damage Cilia

Sulfur Dioxides Cause “**Compounding**”



Cilia melted together cannot move mucus--STAGNATION

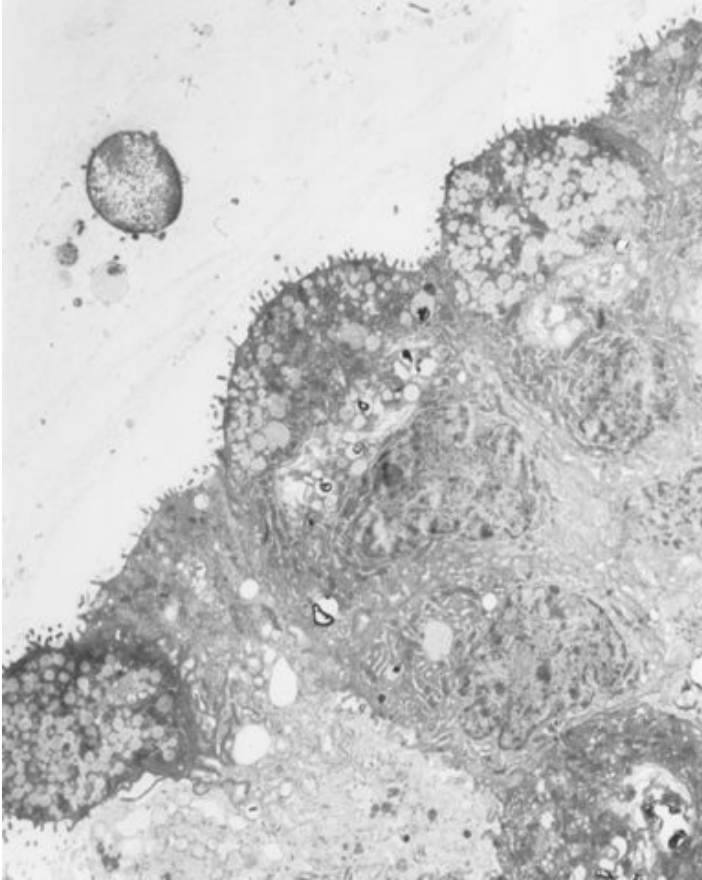
MORE particulate absorption

Bacteria and viruses MORE likely to invade and reproduce

MORE inflammation and **LESS** airflow

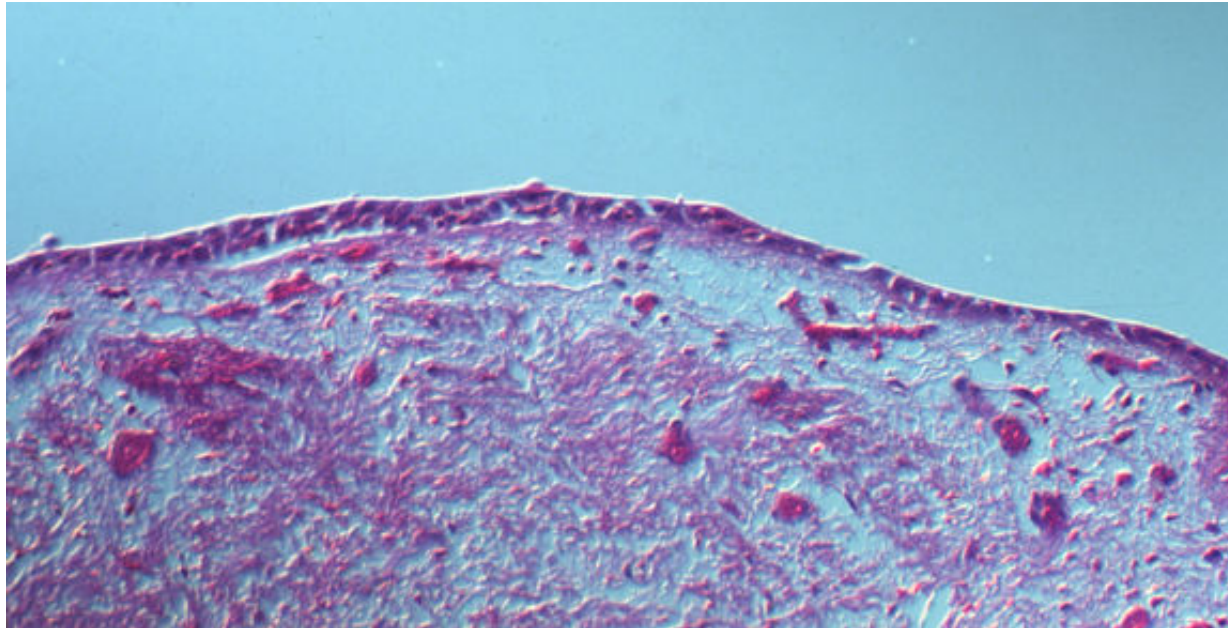
ADDS INSULT TO INJURY for heart baby already short of breath

Further Damage over Time



Mucus cells **replace cilia.**

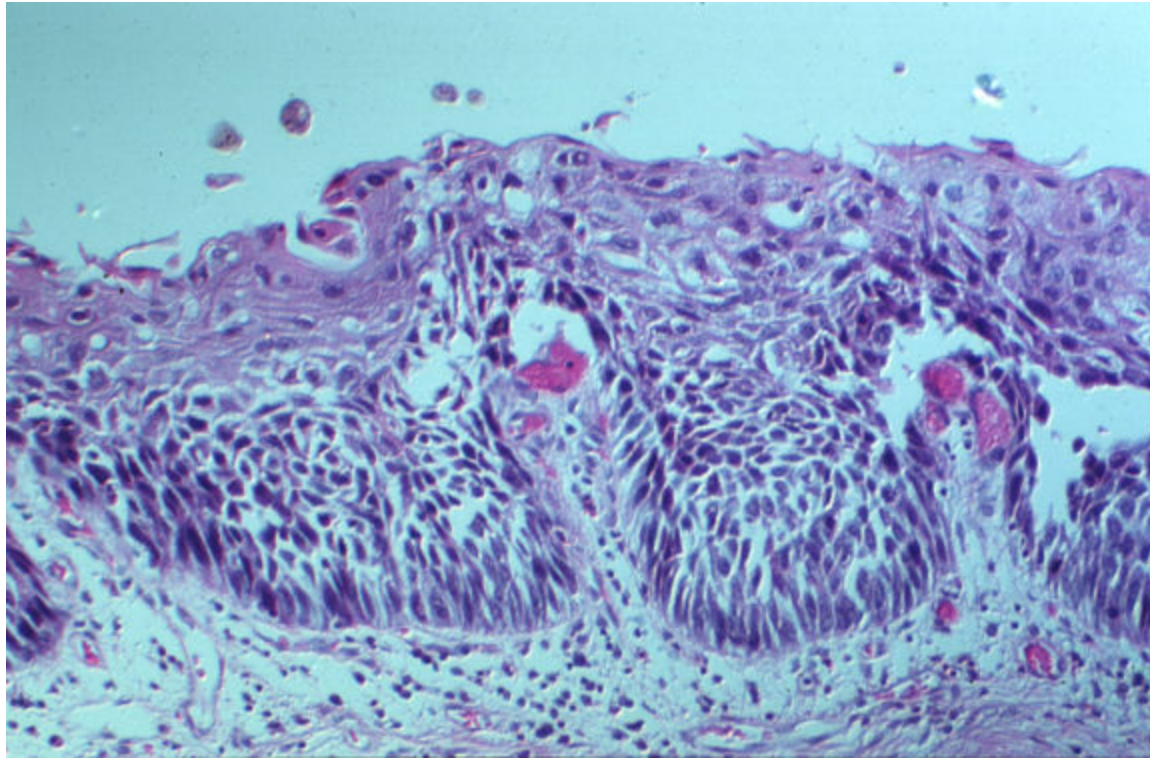
Squamous Metaplasia



Still reversible ONLY if trigger (POLLUTION) is removed

Next step is cancer.

Bronchogenic Carcinoma



LUNG CANCER

© 2012 The University of North Carolina at Chapel Hill School of Medicine

Actual Patient: 14 y/o Boy “N” with Chronic Allergies, Asthma, Sinusitis

- Mom runs home day care.
- **N’s School Air Pollution ranked worst 5% in US (2008 USA Today)**
- Juvenile Diabetes for past 8 years
- Pollution increases **sinus disease** and asthma flares.
- **Coughs**, vomits, **gets dehydrated**, leads to Diabetic Ketoacidosis
- **Inpatient hospital stays** for IV insulin and fluids
- **Can’t** take cheap oral steroids because of diabetes
- Allergy shots, inhalers, visits: **pollutants, especially particulates, increase total cost of care**

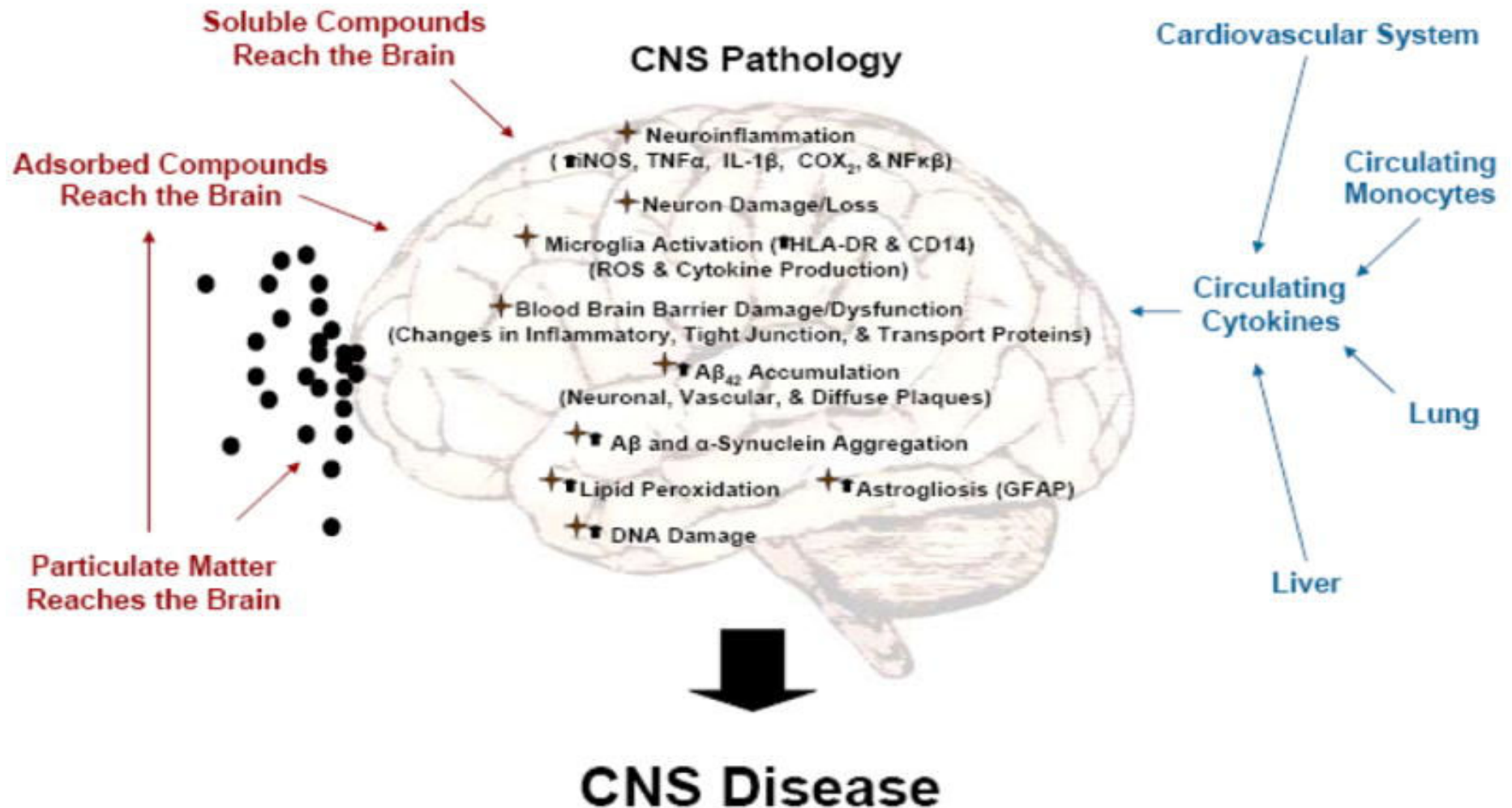
Actual Patient: 12 yo Girl “H” with Cough Variant Asthma

- Has coughed continuously for 3 weeks
- Steroids make her violent; she punches walls **even on inhaled low dose** steroids.
- Marked improvement with expensive air cleaner **demonstrates link to ambient air pollution.**

How Pollutants Damage the Brain

Direct Mechanisms

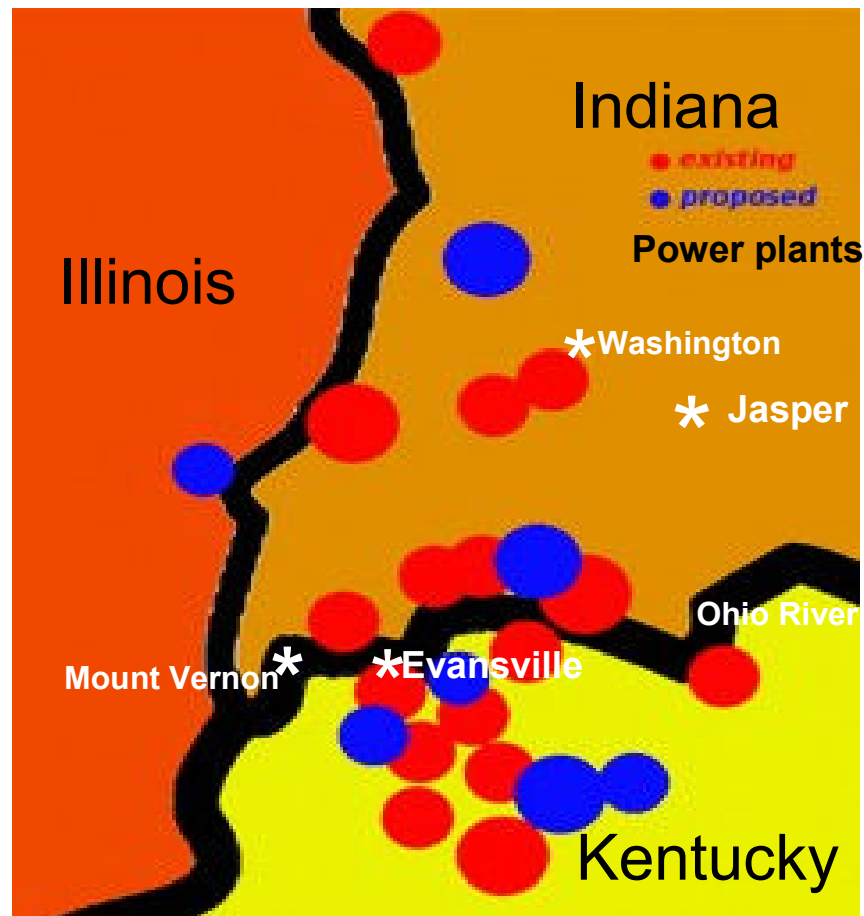
Peripheral Mechanisms



[Trends Neurosci. 2009 September; 32\(9\): 506–516.](#)

Increased % Learning Problems Found in Industry and Power Generator Region

- “Kentuckiana” as a “state” would rank #3 most toxic in USA
- Higher percentage of children needing Special Education services
 - 20% along Ohio River
 - 26% in Mount Vernon
- **Studies show AIR POLLUTION increases LEARNING DISABILITIES**



From press release by John Blair, Valley Watch, August 14, 2012
and Steven Higgs, *NUVO/Bloomington Alternative*, July 24, 2011

Biomass Incinerators Emit a Wide Variety of Air Pollutants INCREASE POLLUTION=INCREASE **RATES OF DISEASES No Safe Threshold for Particulates or Dioxins**

- Brain
 - Learning disabilities
 - Lower IQ
 - Stroke
 - Alzheimer's symptoms
 - Parkinson's symptoms
- Lung
 - Asthma
 - Decreased lung growth
 - COPD
 - Lung Cancer
- Appendicitis
- Reproduction
 - Preterm birth/low weight
 - Chromosomal damage
 - Birth defects
 - Decreased sperm production
- Heart/circulation
 - Congenital heart defects
 - Heart attack
 - Cardiac arrest
 - Arrhythmia
 - Heart failure
 - Ischemic heart disease
 - High blood pressure
 - Peripheral vascular disease

Briefing Website Lists Supporting Articles & Information

Please Stop Subsidies for **POLLUTING** BIOMASS INCINERATORS

- We should not **BREATHE** what **THEY BURN**.🔊
- **BIOMASS INCINERATORS ARE NOT CLEAN ENERGY**
 - **READ THEIR PERMITS.**
 - **CHECK THEIR SMOKESTACKS.**
 - **DO THE MATH—don't forget to ADD THE HEALTH COSTS.**
- We can't **AFFORD** the inevitable inflammatory avalanche.
- Air quality affects **EVERYONE**—for a long time!
- We are **smart** enough to find **better answers**.
- First **do no harm**: **protecting children is priceless.**

www.SaveAmericasForests.org

Biomass Incinerators The Human Health Effects

- Copy of this PowerPoint
- Supporting scientific articles
- More information