Human Health Effects of Biomass Incinerators
A Pediatrician’s Perspective On Air Pollution And Children, With A Focus On
Inflammation

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Congressional Briefing
September 25, 2012

Citations and Support Articles

BRAIN

Long-term air pollution exposure is associated with neuroinflammation, an altered innate immune response, disruption of the blood-brain barrier, ultrafine particulate deposition, and accumulation of amyloid beta-42 and alpha-synuclein in children and young adults.

The adverse effects of air pollution on the nervous system
In the recent past, air pollution has also been associated with diseases of the central nervous system (CNS), including stroke, Alzheimer's disease, Parkinson's disease, and neurodevelopmental disorders
Genc S, Zadeoglulari Z, Fuss SH, Genc K.

Air pollution as an emerging global risk factor for stroke
Mateen FJ, Brook RD.

Brain inflammation and Alzheimer’s-like pathology in individuals exposed to severe air pollution
Calderrón-Garcidueñas L, Reed W, Maronpot RR, et al.
Toxicologic Pathology. 2004;32(6):650–658.4
Brain inflammation and Alzheimer’s-like pathology in individuals exposed to severe air pollution.

Residential Proximity to Freeways and Autism in the CHARGE Study
Conclusions :Living near a freeway was associated with autism. Examination of associations with measured air pollutants is needed.
doi: 10.1289/ehp.1002835

Long-term air pollution exposure is associated with neuroinflammation, an altered innate immune response, disruption of the blood-brain barrier, ultrafine particulate deposition, and accumulation of amyloid β-42 and α-synuclein in children and young adults.
Exposure to air pollution causes neuroinflammation, an altered brain innate immune response, and accumulation of Abeta42 and alpha-synuclein starting in childhood. Exposure to air pollution should be considered a risk factor for Alzheimer's and Parkinson's diseases, and carriers of the APOE 4 allele could have a higher risk of developing Alzheimer's disease if they reside in a polluted environment.


Translocation and potential neurological effects of fine and ultrafine particles a critical update
Morphometric analysis of the CNS indicated unequivocally that the brain is a critical target for PM exposure and implicated oxidative stress as a predisposing factor that links PM exposure and susceptibility to neurodegeneration.


Particulate matter, oxidative stress and neurotoxicity Particulate matter (PM), a component of air pollution has been epidemiologically associated with sudden deaths, cardiovascular and respiratory illnesses. The effects are more pronounced in patients with pre-existing conditions such as asthma, diabetes or obstructive pulmonary disorders. Clinical and experimental studies have historically focused on the cardiopulmonary effects of PM. However, since PM particles carry numerous biocontaminants that are capable of triggering free radical production and cytokine release, the possibility that PM may affect organs systems sensitive to oxidative stress must be considered.


A Research Strategy to Discover the Environmental Causes of Autism and Neurodevelopmental Disabilities
This susceptibility is greatest during unique “windows of vulnerability” that open only in embryonic and fetal life and have no later counter-part (Miodovnik 2011). “Proof of the principle” that early exposures can cause autism comes from studies linking ASD to medications taken in the first trimester of pregnancy—thalidomide, misoprostol, and valproic acid—and to first-trimester rubella infection (Arndt et al. 2005; Daniels 2006). This “proof-of-principle” evidence for environmental causation is supported further by findings from prospective birth cohort epidemiological studies, many of them supported by the National Institute of Environmental Health Sciences (NIEHS).

Philip J. Landrigan, Luca Lambertini, and Linda S. Birnbaum Environ Health Perspect. 2012 July; 120(7): a258–a260. Published online 2012 July 2. doi: 10.1289/ehp.1104285 Exploration of the environmental causes of autism and other NDDs has been catalyzed by growing recognition of the exquisite sensitivity of the developing human brain to toxic chemicals (Grandjean and Landrigan 2006).

Deficits and brain abnormalities: a pilot study with children and dogs. Air pollution, cognitive

Air Pollution: Mechanisms of Neuroinflammation & CNS Disease
Michelle L. Block and Lilian Calderón-Garcidueñas Trends Neurosci. 2009 September; 32(9): 506–516
REPRODUCTION

Ambient Air Pollution and Risk of Birth Defects in Southern California (Increased Conotruncal Defects and other Congenital Heart Defects)
Beate Ritz,1,2 Fei Yu,3 Scott Fruin,4,5 Guadalupe Chapa,4 Gary M. Shaw,6 and John A. Harris
American Journal of Epidemiology Copyright © 2002 Vol. 155, No. 1

Episodic air pollution is associated with increased DNA fragmentation in human sperm without other changes in semen quality.

Ambient air pollution and risk of congenital anomalies: a systematic review and meta-analysis.
DATA SYNTHESIS: Each individual study reported statistically significantly increased risks for some combinations of air pollutants and congenital anomalies, among many combinations tested.

Association between Local Traffic-Generated Air Pollution and Preeclampsia and Preterm Delivery in the South Coast Air Basin of California
Exposure to local traffic-generated air pollution during pregnancy increases the risk of preeclampsia and preterm birth in Southern California women. These results provide further evidence that air pollution is associated with adverse reproductive outcomes.
Jun Wu,1,2 Cizao Ren,2 Ralph J. Delfino,2 Judith Chung,3 Michelle Wilhelm,4 and Beate Ritz4 Environ Health Perspect. 2009 November; 117(11): 1773–1779. Published online 2009 June 23. doi: 10.1289/ehp.0800334

Chronic Air Pollution Exposure during Pregnancy and Maternal and Fetal C-Reactive Protein Levels: The Generation R Study
Conclusions: Our results suggest that exposure to air pollution during pregnancy may lead to maternal and fetal inflammatory responses.
Edith H. van den Hooven,5,6,12 Yvonne de Kluizenaar,2 Frank H. Pierik,2 Albert Hofman,3 Sjoerd W. van Ratingen,7 Peter Y.J. Zandveld,7 Jan Lindemans,4 Henk Russcher,4 Eric A.P. Steegers,5 Henk M.E. Miedema,2 and Vincent W.V. Environ Health Perspect. 2012 May; 120(5): 746–751. Published online 2012 February 3. doi: 10.1289/ehp.1104345

HEART and CIRCULATION

Air Pollution and Cardiovascular Disease
A Statement for Healthcare Professionals From the Expert Panel on Population and Prevention Science of the American Heart Association
Ambient Air Pollution and the Progression of Atherosclerosis in Adults
Cross-sectional studies suggest an association between exposure to ambient air pollution and atherosclerosis. We investigated the association between outdoor air quality and progression of subclinical atherosclerosis (common carotid artery intima-media thickness, CIMT).

http://www.plosone.org/article/info%3Adoi/10.1371/journal.pone.0009096

Air pollution related prothrombotic changes in persons with diabetes
Jacobs L, Emmerechts J, et al.

Association Between Changes in Air Pollution Levels During the Beijing Olympics and Biomarkers of Inflammation and Thrombosis in Healthy Young Adults

Chronic Fine Particulate Matter Exposure Induces Systemic Vascular Dysfunction via NADPH Oxidase and TLR4 ePathways.
Circulation Research, 2011; 108 (6): 716 DOI: 10.1161/CIRCRESAHA.110.237560

Cardiovascular Effects of Ambient Particulate Air Pollution Exposure
Contemporary Reviews in Cardiovascular Medicine:
Qinghua Sun, MD, PhD; Xinru Hong, MD, PhD; Loren E. Wold, PhD
Review article
http://circ.ahajournals.org/content/121/25/2755.full

Cardiovascular Mortality and Long-Term Exposure to Particulate Air Pollution
Epidemiological Evidence of General Pathophysiological Pathways of Disease
C. Arden Pope III, PhD; Richard T. Burnett, PhD; George D. Thurston, ScD; Michael J. Thun, MD;
Eugenia E. Calle, PhD; Daniel Krewski, PhD; John J. Godleski, M
10-mcg/m3 elevation in fine PM was associated with 8% to 18% increases in mortality risk,
Circulation. 2004; 109:71-77
Inhalation of Environmental Stressors & Chronic Inflammation: Autoimmunity and Neurodegeneration

Sandra E. Gomez-Mejiba, Zili Zhai,1 Hammad Akram,1 Quentin N. Pye,1 Kenneth Hensley,1 Biji T. Kurien,2 R. Hal Scofield,2,3 and Dario C. Ramirez

Normal cilia slide
http://pediatrics.med.unc.edu/specialties/airid/pcd/injury  cilia slides
http://www.youtube.com/watch?feature=endscreen&v=FQwqhbxz31&NR=1  cilia video
http://www.google.com/imgres?imgurl=http://yousigma.com/health/asthma.jpg&imgrefurl=http://yousigma.com/health/asthma.html&h=548&w=546&sz=59&tbm=isch&tbnid=zPWI7AafCL9LOM:&tbnh=90&tbnw=90&prev=/search?q=%20pictures%20asthma&sa=X&ei=dCZFUImEMpSE9SNm4GYBq&ved=0CQkQ9QEwAw&dur=500  asthma image used on slides

http://www.arb.ca.gov/research/chs/chs.htm#new  results of California child health study

Major Results of the Study—child health study

- **Air Pollution Harms Children’s Lungs for Life** - Children exposed to higher levels of particulate matter, nitrogen dioxide, acid vapor and elemental carbon, had significantly lower lung function at age 18, an age when the lungs are nearly mature and lung function deficits are unlikely to be reversed. [USC](N Engl J Med 2004; 351:1057 - 1067 (Link to the article - May require registration)]

- Children that were exposed to current levels of air pollution had significantly reduced lung growth and development when exposed to higher levels of acid vapor, ozone, nitrogen dioxide and particulate matter which is made up of very small particles that can be breathed deeply into the lungs. [Summary of the Article](Am J Respir Crit Care Med 2002; 166:76 - 84 (Link to the article - May require registration)]

- Children living in high ozone communities who actively participated in several sports were more likely to develop asthma than children in these communities not participating in sports. [Press Release January 31, 2002.](Lancet 2002; 359:386 - 391 (Link to the article - May require registration)]

- Children living in communities with higher concentrations of nitrogen dioxide, particulate matter and acid vapor had lungs that both developed and grew more slowly and were less able to move air through them. This decreased lung development may have permanent adverse effects in adulthood. [Am J Respir Crit Care Med 2000; 162:1383 - 1390 (Link to the article - May require registration)]

- Children who moved away from study communities had increased lung development if the new communities had lower particulate matter levels, and had decreased lung development if the new communities had higher particulate matter levels. [J Respir Crit Care Med 2001; 164:2067 - 2072 (Link to the article - May require registration)]
Days with higher ozone levels resulted in significantly higher school absences due to respiratory illness. Children with asthma who were exposed to higher concentrations of particulate matter were much more likely to develop bronchitis.

Epidemiology 2001; 12:43 - 54 (Link to the article - May require registration)

APPENDICITIS

Effect of ambient air pollution on the incidence of appendicitis

We found that the incidence of appendicitis was significantly associated with short-term exposure to air pollution. The effect of air pollution was greatest in the summer months, when individuals were most likely to be outside and exposure estimates from fixed-site monitors better reflected an individual’s exposure.

Gilaad G. Kaplan, MD MPH, Elijah Dixon, MD MSc, Remo Panaccione, MD, Andrew Fong, MSc, Li Chen, MSc, Mieczyslaw Szyszkowicz, PhD, PhD, Anthony MacLean, MD, W. Donald Buie, MD MSc, Terry Leung, MD, Steven J. Heitman, MD MSc, Paul J. Villeneuve, PhD

PEDIATRIC SUSCEPTIBILITY

Children's vulnerability to toxic chemicals: a challenge and opportunity to strengthen health and environmental policy.

Landrigan PJ, Goldman LR.
Mount Sinai School of Medicine, in New York City, NY, USA.
phil.landrigan@mssm.edu

WEBSITES CITED:

American Lung Association June 24, 2009
Letter to Chairman Waxman and Chairman Markey
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 Ohio Valley's toxic kids & Indiana's toxic air affecting children by Steve Higgs
In the 19 Indiana counties closest to the Ohio, one in five public school children were in special education. In Evansville, it was 22 percent. Twenty miles to the west, in Mount Vernon, it was 26 percent. According to data from the Indiana Department of Education (DoE), 27 percent of the 916 students in the New Harmony Town and Township School Corporation received special education services during the 2008-09 school year.

http://www.nuvo.net/indianapolis/the-ohio-valleys-toxic-kids/Content?oid=1329316
Exposure to cancer-causing toxics National Rank 5th percentile
FERDINAND ELEMENTARY SCHOOL 402 E 8TH ST FERDINAND, IN
Ferdinand Elementary School

If the Tri-State were a State, we would be 3rd in the release of toxic chemicals to the air, nationwide.
Posted on August 14, 2012 by John Blair
August 14, 2012 – Press Release of Valley Watch, Inc.
Valley Watch found that this relatively small area, about a third the size of Indiana and a little less than a third the size of Kentucky would place Third if the studied region was a separate State, just ahead of Pennsylvania and far surpassing Indiana as a whole at 31,641,412 pounds of air toxics released in 2010.

http://valleywatch.net/