

Human Health Effects of Biomass Incinerators: A Pediatrician's Perspective on Air Pollution and Children, with a Focus on Inflammation

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Narrative to PowerPoint Presentation

1. I am going to focus what air pollution and inflammation can do to human bodies, especially children. Whether air pollution is from fossil fuel sources or biomass incinerators, it causes human disease. Wherever there are biomass incinerators in America, there are children who inhale that air pollution and they suffer from the same diseases as my patients, who breathe air pollution from industries and coal-fired generators.

2. My Education and Credentials

3. My Professional Experience

4. This talk is also for my "green" father, mathematical mother, wonderful computer geek husband, Eagle Scout sons, and countless others hoping we change course on how we generate electricity.

5. Southern Indiana has air pollution that is among the nation's worst. Sinus and respiratory disease in the area is known as Ohio Valley disease. Many parents have told me that they and their children suffered more frequent illness upon moving here and notice improvement when they travel elsewhere. My days have always been filled with complaints of coughs and runny noses.

6. The mother of these two little girls gave me permission to show this photo & discuss this case. She asked me why the older child was coughing so much, but when I showed her the air pollution picture I had taken earlier that day, she said "This just isn't fair." Air pollution also increases the % of conotruncal heart defects, like baby's Tetralogy. My Amish and Mennonite families routinely buy Pulmicort for their children instead of oral steroids, because it's better. Asthma is expensive.

7. "The American 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."

8. Biomass incinerator energy is DIRTY energy with terrible human health consequences. Biomass air pollution may vary depending on the materials that are burned, but the similarity with coal is that dangerous pollutants are liberated whenever something is burned. Air pollutants escape despite filter technology, and initiate a nonspecific inflammatory cascade regardless of their source. My patients are suffering from air pollution from fossil fuel and industrial sources. Citizens in my community and across the country do not want additional air pollution from biomass incinerators.

9. Inflammation **becomes** a disease when the trigger, air pollution, doesn't go away. It is a CASCADE without a defined endpoint, not a tightly regulated feedback loop. It causes and worsens many SERIOUS medical conditions.

10. Diseases caused by air pollution are DOSE related to both ACUTE and CHRONIC exposure, and cascade processes are DIFFICULT to abort. Countless medical studies clearly demonstrate that current pollution levels are not low enough to protect the public, especially from particulates.

11. Our lungs are a very effective vacuum for air pollution—ultrafines and nanoparticulates also penetrate the NOSE & “stick” in the BRAIN, airways and air sacs and are slow or impossible to eliminate. While air pollution causes asthma, cilia damage, and airway remodeling IN the lung which already carry a huge price tag and burden, the **lung is also the portal to the body** and these pollutants enter the bloodstream and can affect almost every organ by initiating, sustaining, or worsening inflammation

12. Kids take more breaths & want to spend more time outside. Pollution may hit them up to 10X harder than adults. Not only does pollution limit lung growth, but a child's disease affects his parents, who miss work and sleep. A child's potential employment, athletic participation, and health care costs are permanently affected by damage to lungs and brain from cumulative lifetime exposure. Here is another cascade without an endpoint.

13. We may think that medicine will cure everything if we throw enough money at it, but it's an expensive industry that has already solved the easy challenges. The only cure for diseases caused by air pollution is to decrease emissions, which means not building biomass incinerators.

14. Asthma is airway inflammation and bronchial constriction caused by a trigger such as air pollution. Notice the healthy open bronchial tube on the right, and the one on the left that is swollen and constricted by inflammation, severely blocking a child's airflow.

15. The cilia lining is progressively damaged, and it's felt that the epithelial disruption, or breaks in the lining of the airway, trigger not only swelling and mucus production which are treatable with meds, but also progression to FIBROSIS or IRREVERSIBLE AIRWAY REMODELING.

16. In addition, the Hagen-Poiseuille equation states air flow rate is proportional to r^4 , meaning that especially in children with little airways, small changes in this radius cause a large INCREASE in airway RESISTANCE and DECREASE in potential AIR FLOW and clearance.

17. Asthma is a serious and expensive medical condition caused and/or exacerbated by air pollution, the kind of air pollution that comes out of biomass incinerator smokestacks.

18. Many stay on inhaled steroids indefinitely at a cost of \$40-200/month. Many don't take them and develop lung damage from ongoing inflammation.

19. Besides airway remodeling, AIR POLLUTION damages the cilia which are critical to keeping the lungs clean. 2:40-3:20. Here we have a computer graphic of cilia beating together, first in slow motion then at their normal speed of 15 cycles per second, moving mucus out at 10 mm/min; then zooming out to an actual video of live tracheal tissue, showing particles being carried out on the mucus layer.

20. This is a cross-sectional view of normal healthy cilia

21. Pollutants such as sulfur dioxides melt cilia cells together, called compounding, increasing risk of infection because invaders have more time. Relate to the blue baby that struggles to breathe already.
22. Over time, the cilia cells are replaced by cells that make mucus which obstructs airways, causes coughing, and breeds infection.
23. This airway is severely damaged and, like most end stage inflammatory states, precancerous. Amazingly, THE TISSUE STILL CAN HEAL WITHOUT A DOCTOR if the trigger, the AIR POLLUTION, is removed.
24. Cells may deteriorate to cancer. These severe lung diseases are caused or exacerbated by air pollution, and **biomass incinerators emit air pollution.**
25. My patient N has severe medical problems affected by air pollution. His mom runs a day care center, so other families are collaterally burdened when he is ill. N's school near Jasper is in the top 5% of U.S. pollution exposure. He developed type I diabetes, an inflammatory autoimmune disease. Sinus infections and asthma flares make him cough like crazy, and since he can't tolerate oral steroids, he still ends up in the ER and hospital several times a year from coughing and vomiting causing dehydration and DKA, in addition to the baseline cost of his diabetes care, allergy testing & shots and asthma inhalers. His "Asthma Action Plan" includes lots of meds but the family can't move away to avoid emissions.
26. My patient H has Cough Variant Asthma meaning she coughs more than wheezes. She lives in Washington Indiana & gets violent even on inhaled steroids. Her mom recently called for refills on her inhalers so she may start swinging, hopefully not at school. Last week a different mom said her 3 year old SON had "bug eyes" on steroids.
27. Particulates can reach the brain through the nose, allowing access deep into the brainstem. Heavy metals also stick to the particulates. The brain is inflamed, and inflamed organs don't work as well.
28. Pollution in our area affects how our children think. **The heavy air pollution in my region correlates with the increased need for special education services** clustered right along the Ohio River. **If biomass incinerators are added here or anywhere else, they will increase air pollution and human diseases. It is that simple.**
29. Biomass incinerators emit a wide variety of air pollutants, depending on the fuel source. They also increase truck traffic, causing exposure to diesel particulates from fossil fuel. No organ or system escapes the inflammatory attack. The diseases on this slide alone would need hours to cover in depth, but you should be aware that the many pollutants from biomass incineration cause the body to attack itself by triggering either inflammation or direct cell damage. Please visit the briefing website for articles documenting the increased risk of disease.
30. Please stop biomass incinerator subsidies. We **should not** breathe what they burn. Air pollution from biomass incinerators is not clean. We cannot afford polluting power and what it will cost our children. We ARE smart enough to find better answers to protect our children's future.
31. Our website has a copy of this PowerPoint and supporting articles and information:
www.SaveAmericasForests.org