

# Why Restrict Gas Leaf Blowers?

## *Health Risks and Alternatives*



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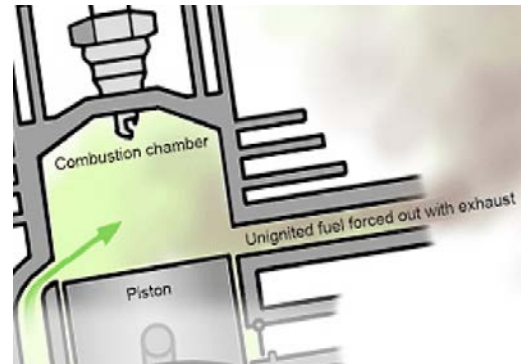
SUNY @ Stony Brook School of Medicine



NO GAS LEAF BLOWERS

# Why Should Communities Restrict Gasoline Leaf Blowers?

## ▶ Gas Exhaust Pollution



## ▶ Fine Particulate Pollution



## ▶ Noise Pollution





## What are Alternatives to Gas Leaf Blowers (GLBs)?



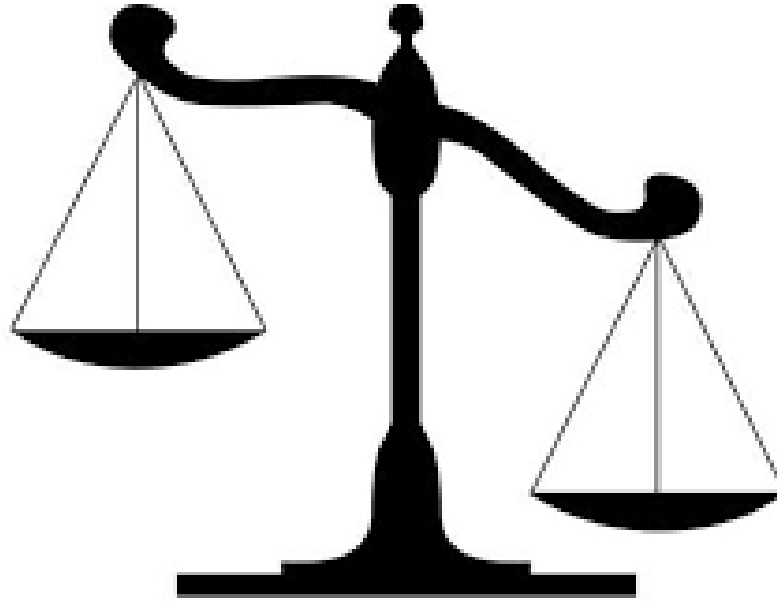
- ▶ Commercial and residential economically viable lithium ion battery alternatives now exist
  - ▶ Batteries are safe and recyclable
  - ▶ Rapid return on investment
- ▶ Rakes and broom are ideal
  - ▶ May not yet be acceptable to homeowners/landscapers
- ▶ Mulching mowers
  - ▶ Better for environment



# GLB Risks Outweigh Benefits

## Benefits?

- Perceived increased efficiency and efficacy - *false*
- Perceived economic benefit - *false*



## Risks

- Increased equipment costs
- Worker health hazards
- Homeowners/neighbors health hazards
- Hearing loss
- Decreased productivity of nearby adults/children
- Increased air pollution
- Disrupted ecosystems
- Lawsuits for landscape companies

# Children are Particularly Vulnerable

- ▶ Faster breathing rate
  - ▶ Breathe more air/pound body wgt than adults
- ▶ Smaller than adults....lower to the ground
- ▶ Organs are still developing
  - ▶ Brains, lungs, kidneys
  - ▶ “Window of vulnerability”
- ▶ Greater interaction with the outdoors
  - ▶ Warmer months particularly
  - ▶ Times when GLBS most in use



# Others with Great Vulnerability

- ▶ Landscape workers
  - ▶ Rarely use protective devices
  - ▶ Work long hrs close to source
  - ▶ Breather harder and more deeply
- ▶ Senior citizens
- ▶ Pets
- ▶ Those with lung or heart disease
- ▶ Pregnant women



# Exhaust Pollution



- 1 gas-powered leaf blower generates as much exhaust pollution in 1 hr as 17 cars traveling slowly
- Cars disperse their pollutants over long stretches of road, while blowers concentrate their pollutants in 1 neighborhood
- 2-stroke engine fuel is a gas-oil mixture that is especially toxic compared to automobile emissions.



# Leaf Blowers and Air Pollution

## ▶ Volatile organic compounds (VOC)

- ▶ Benzene
- ▶ 1,3 butadiene
- ▶ Acetaldehyde
- ▶ Formaldehyde

## ▶ Nitrogen oxides (NOx)

## ▶ Carbon monoxide

## ▶ Carbon dioxide

## ▶ Hydrocarbons

## ▶ Particulate matter

\*Hazardous air pollutants (HAPs) = as pollutants that cause or may cause cancer or other serious health effects. Source: EPA  
Small particles are formed by a mix of components , eg, acids, organic chemicals, metals, soil, dust.

## HAPs\*

- Toxic
- Carcinogenic and/or
- Ozone-forming

# Small lawn/garden engines: A major contributor to emissions

- ▶ In the United States, 2010:
  - ▶ VOCs: 515,000 tons
  - ▶ NOx: 121,000 tons
  - ▶ PM2.5\*: 25,000 tons
  - ▶ PM10\*: 26,000 tons
- ▶ Account for 5%–10% of total US emissions of carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and PM2.5.

NOx: Nitrogen oxides; PM: particulate matter; PM2.5:  $\leq 2.5$   $\mu\text{m}$  in diameter; PM10:  $\leq 10$   $\mu\text{m}$  in diameter; VOC: volatile organic compounds

\*Sources: Michaels H, US EPA. NONROAD Overview presented at the 2012 International Emission Inventory Conference, 2012.  
US EPA 2005 data in Volckens J, Olson DA, Hays MD. Atmospheric Environment 2008;42:1239-48.



# Gas Leaf Blowers: Thousands of Tons of Pollutants/Year

Nitrous  
Oxides

Volatile Organic  
Compounds  
toluene, benzene,  
formaldehyde and others

Fine  
Particulates  
<2.5 microns

Carbon  
Monoxide

"Ozone and particle pollution threaten the health of  
millions of Americans."  
--American Lung Association

# Air Pollutants Produced by Gas Leaf Blowers

- ▶ Volatile organic compounds (VOCs) from burned and unburned fuel
  - ▶ Toxic, carcinogenic
  - ▶ Combine with nitrogen oxides in the air to form ground-level ozone (smog)
- ▶ Nitrogen oxides, carbon monoxide, carbon dioxide\*
- ▶ Benzene, 1,3 butadiene, acetaldehyde, formaldehyde\*\*
- ▶ Polycyclic aromatic hydrocarbons

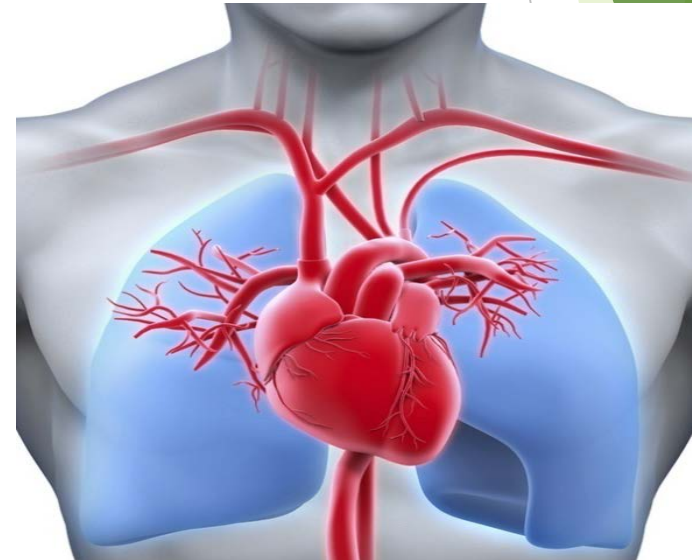


\*considered by EPA to be "Criteria Pollutants": harmful to public health and the environment

\*\*EPA considers these "Hazardous Air Pollutants": cause or may cause cancer or other serious health effects

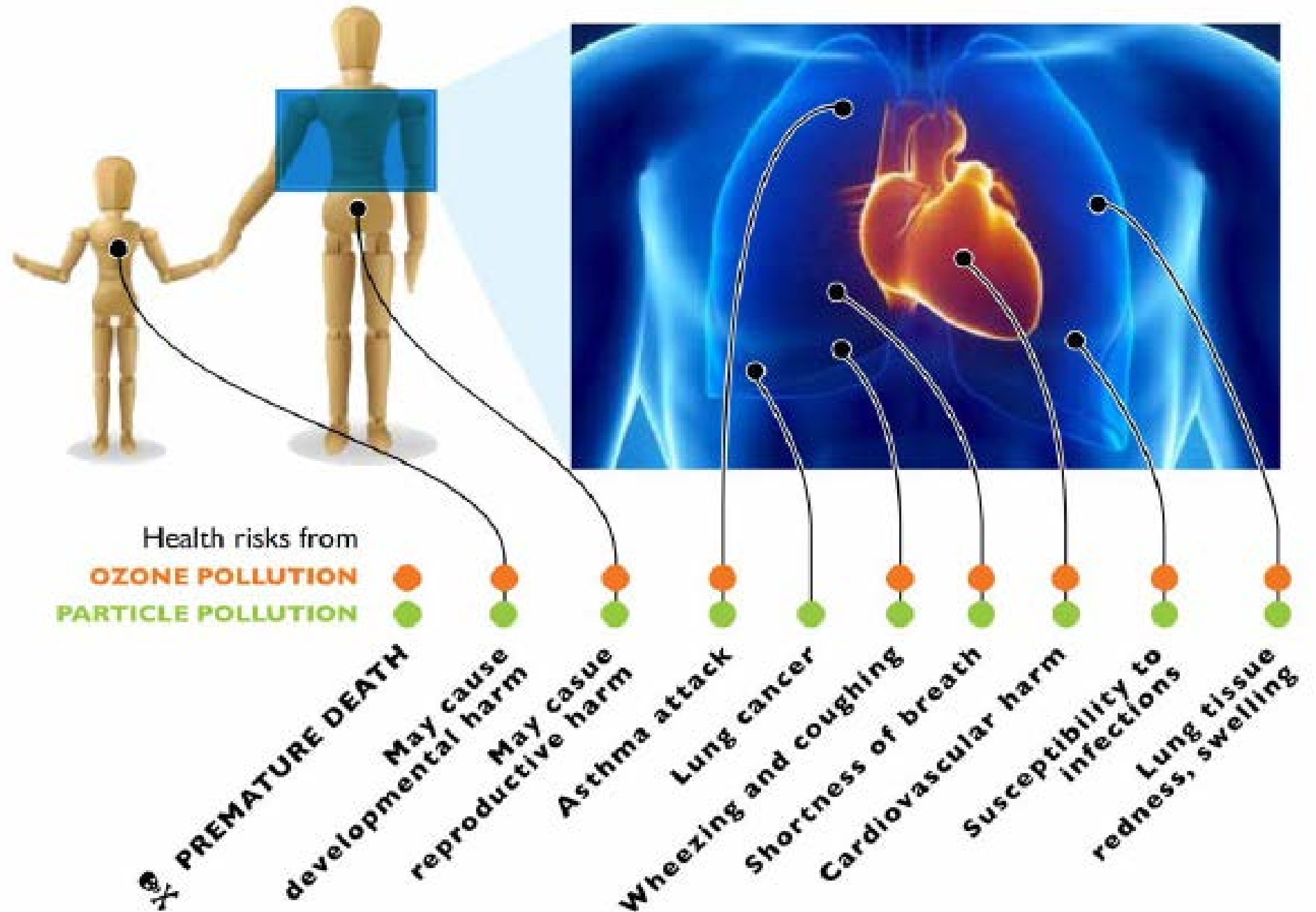
# Health Effects of Exhaust Pollution ("Hazardous Air Pollutants" and "Criteria Air Pollutants"\*)

- ▶ Respiratory irritants
- ▶ Increased cardiovascular disease
- ▶ Increased risk of cancers:
  - ▶ Breast, lung, bladder, leukemias



\*According to the EPA

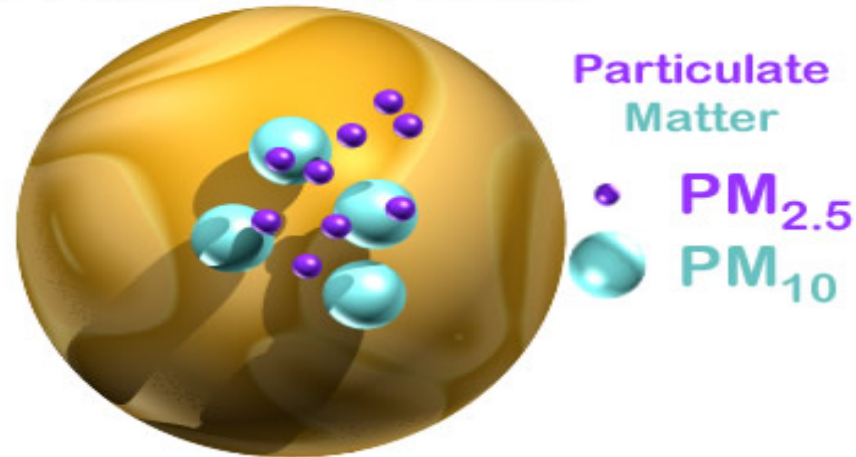
# Health Effects: Gas Lawn Equipment



Source: American Lung Association

# Fine Particulate Pollution

Beach Sand Grain



*The smaller the particle,  
the deeper it penetrates into the lungs and  
the more hazardous it is to breathe.*

# Possible Particulate Components

- ▶ Mold, fungus spores
- ▶ Pollen
- ▶ Insect eggs
- ▶ Heavy metals
- ▶ Animal feces
- ▶ Weed seeds
- ▶ Fertilizer products

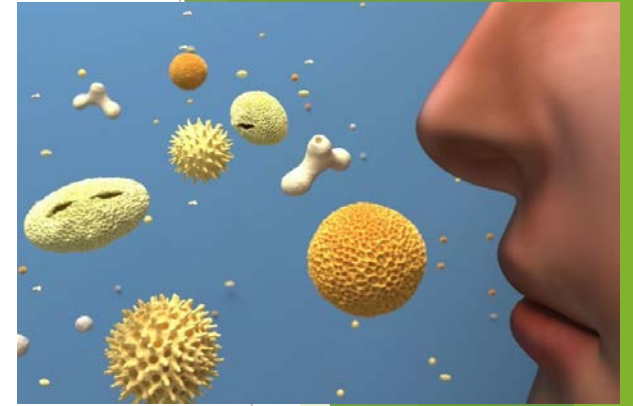


*Approximately 5 lbs particulate matter  
per leaf blower/hr are blown up*



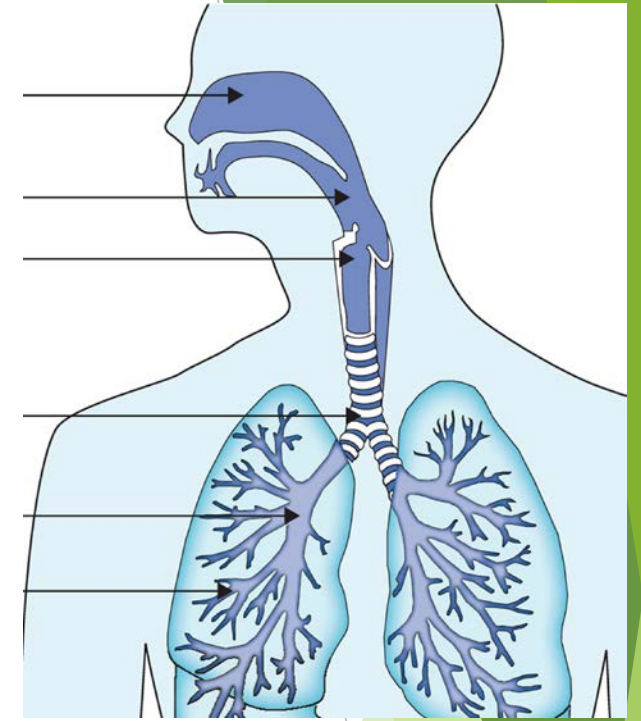
# Risks of Particulates

- ▶ Exposure in pregnancy:
  - ▶ Premature birth
  - ▶ Low birth rate
  - ▶ Increased autism risk (with 3<sup>rd</sup> trimester exposure)
- ▶ Decreased fertility
- ▶ Heart attacks
- ▶ Irregular heartbeat (arrhythmias)
- ▶ Strokes
- ▶ Congestive heart failure



# Risks of Particulates (Cont.)

- ▶ Worse cognitive function in older adults
- ▶ Lung diseases
  - ▶ Cancer
  - ▶ Asthma attacks
  - ▶ Bronchitis
  - ▶ Increased severity of chronic lung disease in elderly
- ▶ Reduced life expectancy



*Even Low Levels Increase Death Rates*

Gas Leaf Blower  
Noise:  
More Than  
Just An Annoyance



# Leaf Blower Noise

- ▶ Noise levels in decibels (dB)\*
  - ▶ 100–115 dB
  - ▶ 65–75 dB at 50 ft
  - ▶ Higher levels with >1 machine
    - ▶ Exceeds noise safety standards set by WHO and US EPA
- ▶ • Noise characteristics
  - ▶ Pure tone (narrow frequency) component
  - ▶ Frequent throttling up and down
  - ▶ Chronic, prolonged duration
  - ▶ Carries over long distances
  - ▶ Penetrates walls/windows



\* Ambient noise in a quiet area is generally in the range of 40–45 dB.

# Health Risks of Noise



- ▶ Increased stress hormone levels, which →
  - ▶ High blood pressure
  - ▶ Abnormal glucose metabolism
  - ▶ Obesity
  - ▶ Stroke, heart disease
- ▶ Sleep disruption
- ▶ Hearing loss, tinnitus
- ▶ Lost productivity/ poorer task performance
  - ▶ School children: lower test scores\*
- ▶ Hyperactivity
- ▶ Impaired communication and social interaction

*\*Over 20 studies have shown that noise adversely affects children's academic performance*

# Health Organizations Call for Leaf Blower Restrictions



- ▶ Medical Society of the State of NY
- ▶ Massachusetts Medical Society
- ▶ American Academy of Pediatrics
- ▶ American Public Health Association
- ▶ Children's Environmental Health Network
- ▶ Harvard Medical School
- ▶ Local hospitals, health networks

Let's Work Towards  
A Cleaner and Healthier  
Environment  
for  
All of Us

*Thank You*



# Additional Resources

- ▶ <https://www.fairwarning.org/2017/09/leaf-blower/>
- ▶ [Noisy, But That's Not All](#)
- ▶ Leaf Blowers Flagged as Prodigious Polluters -- And Possible Health Threat
  
- ▶ **Study: Gas leaf blowers put out more pollution than F-150 trucks**