AMERICAN LUNG ASSOCIATION.

CLEAN AIR CHOICE®

CLEAN AIR CHOICE© IMPROVING THE AIR WE BREATHE

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Davenport
November 2019

OUR HISTORY

AMERICAN LUNG ASSOCIATION.

CHICAGO AREA CLEAN CITIES

- Oldest voluntary public health agency in the United States
- Founded in 1904
  National Association for the Study & Prevention of Tuberculosis
- Adopted “American Lung Association” name in 1973
- Air quality & lung health
- 1970 EPA
- Model for Public Health Agencies
- Partner with Clean Cities

Mission: To save lives by improving lung health and preventing lung disease

WHEN YOU CAN'T BREATHE, NOTHING ELSE MATTERS!

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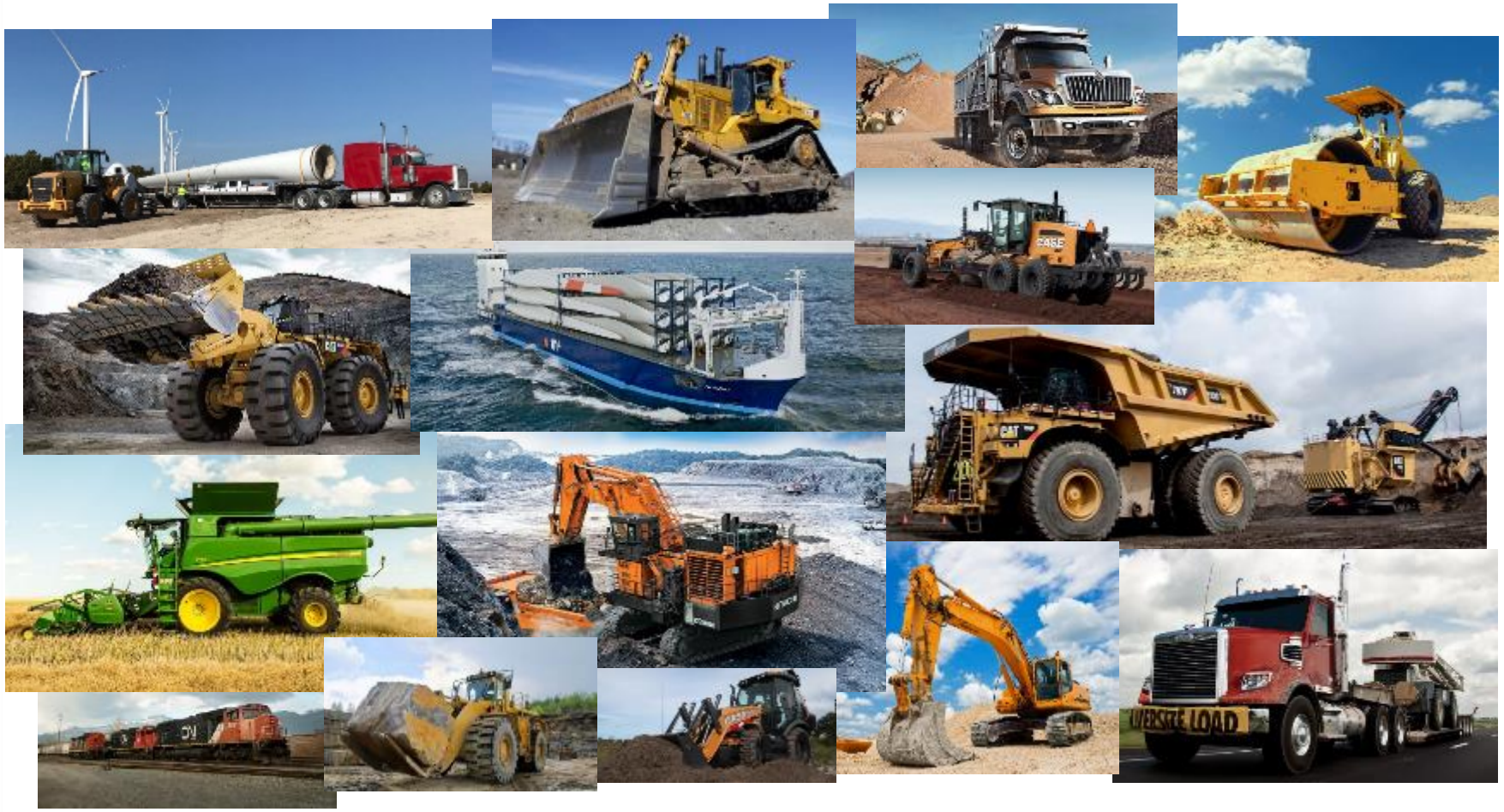
ENVIRONMENTAL AIR POLLUTION

Health Conditions linked to Air Pollution exposure (such as lung cancer and emphysema) are often fatal

- **Globally* = 6.1 million death from air pollution (12% of global deaths in 2016)**
  - **✓4.1 million = outdoor or ambient air pollution**
  - **✓2.6 millions = indoor fires and heat**

**University of Washington's Institute for Health Metrics and Evaluation*



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Source: Multiple

WHEN YOU CAN'T BREATHE, NOTHING ELSE MATTERS!

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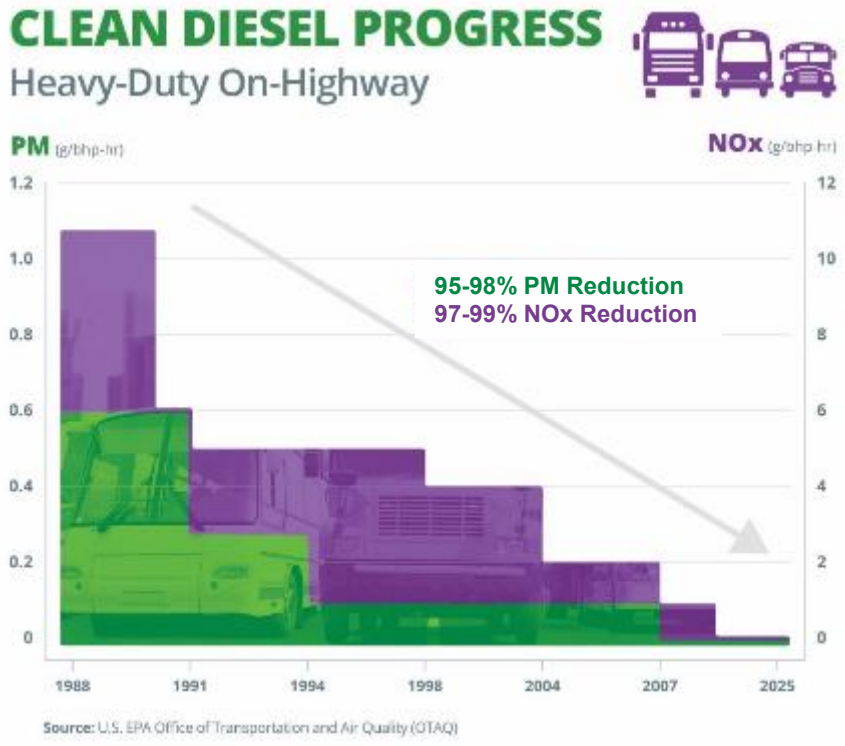
LEGACY DIESEL VEHICLES



Source: DTF

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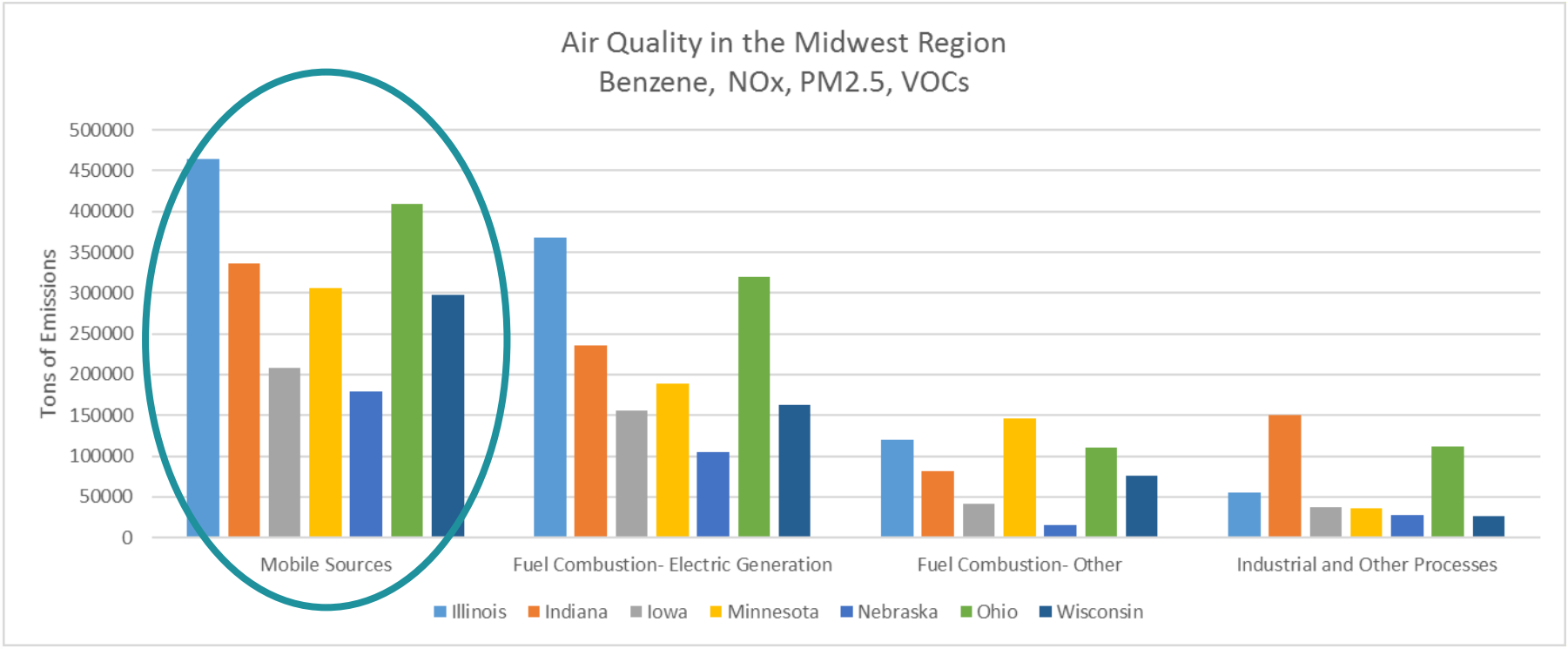
MOBILE SOURCES CAUSE THE MOST AIR POLLUTION



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WHO IS AT RISK FROM AIR POLLUTION?

Aging brings a gradual decline in the body's systems that makes us more vulnerable.

Having asthma or other lung diseases, cardiovascular disease or diabetes puts you at higher risk.

Poorer people often live closer to sources of pollution, may have higher incidence of disease, and less access to care.

EVEN HEALTHY ADULTS CAN FACE INCREASED RISK

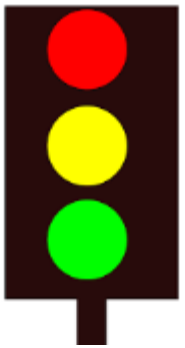
Working or exercising outdoors increases exposure, especially near highways.

EMISSIONS FROM MOBILE SOURCES

Engine operation

Fuel components

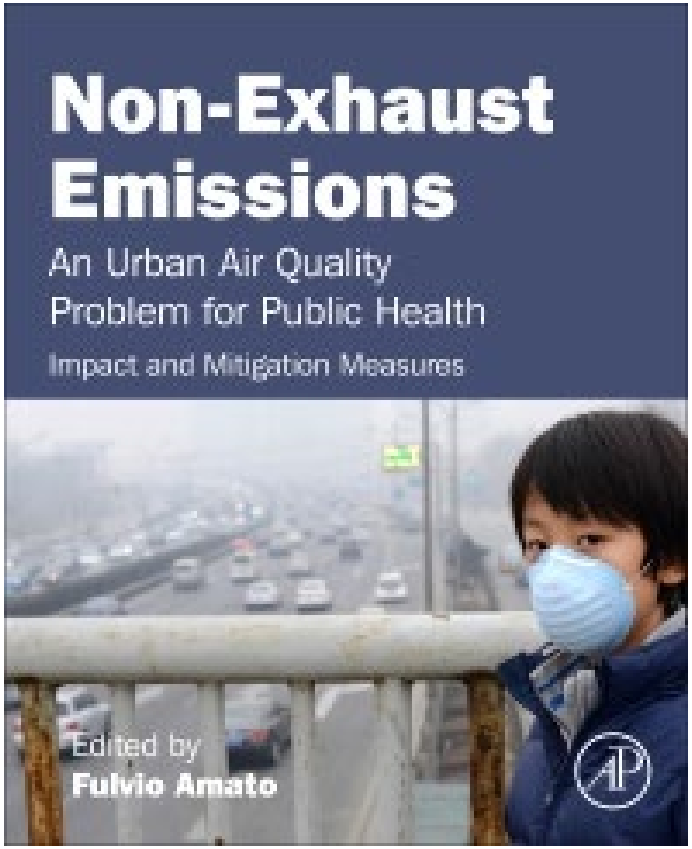
- Exhaust emissions
- In car emissions
- Trip emissions
- Refueling emissions
- Evaporative emissions (hot days>cold days)
- Old VS new engines



EMISSIONS FROM MOBILE SOURCES

Non-Exhaust Emissions

- Direct brake wear
- Direct tire wear
- Road wear
- Road dust suspension



FACTORS AFFECTING MOBILE EMISSIONS

System Efficiency

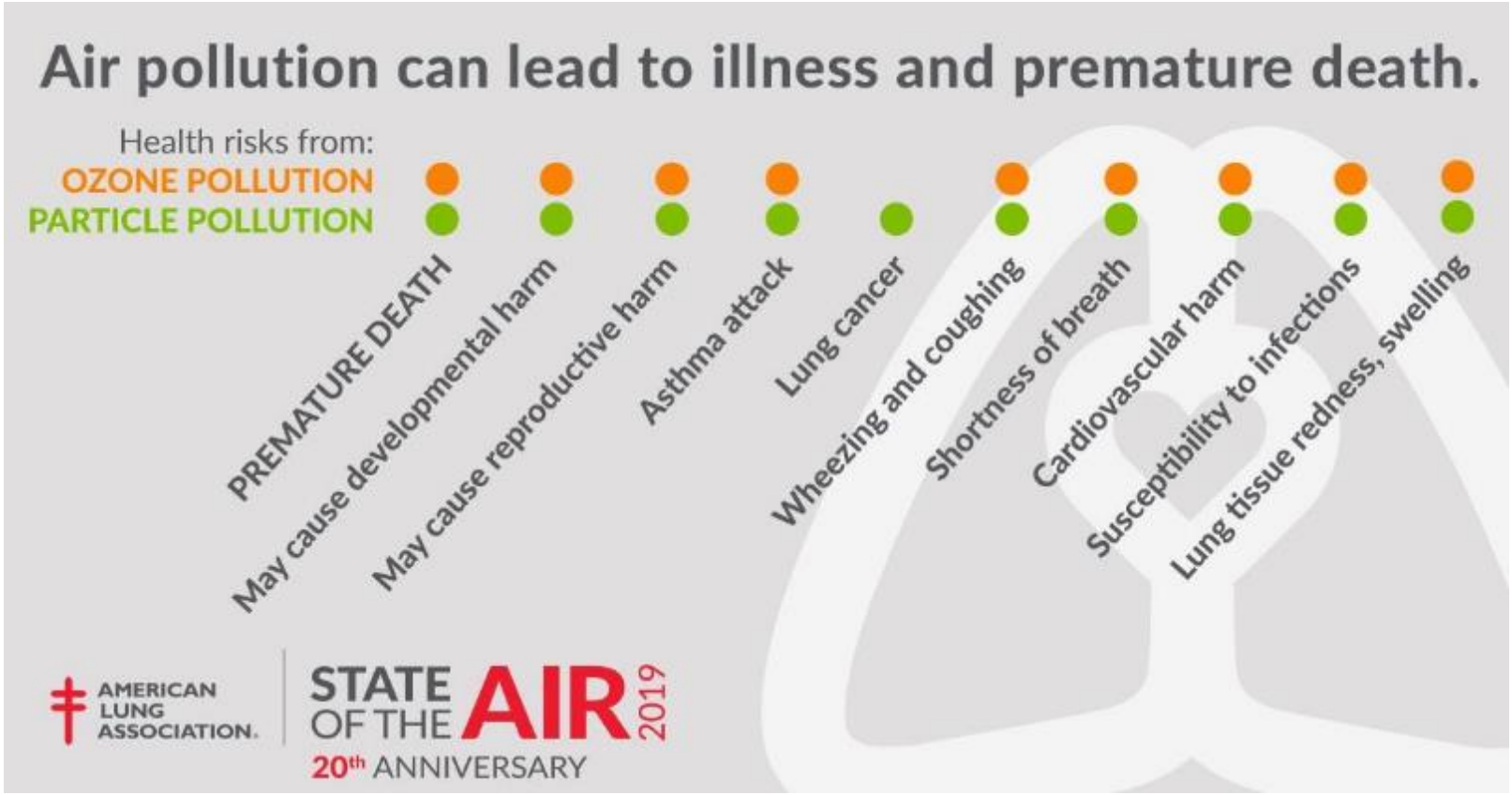
- Exceeds road design (infrastructure)
- Exceeds numbers
- Vehicle age and design
- Traffic signaling and speed
- Idling
- Lowering fuel consumption (increase mileage)
- Mass transportation
- Goods movement improvements

U.S. HEALTH & ENVIRONMENTAL EFFECTS

- Population = 321 M
- Chronic Lung Disease = 36 M (10% of population)
- Pediatric Asthma = 6 M
- Adult Asthma = 23 M
- COPD = 15 M
- Lung Cancer = 228,150
  Lung Cancer Deaths = 148,945

American Lung Association Lung Health Statistics
Updated October 2019

WHY DOES IT MATTER?

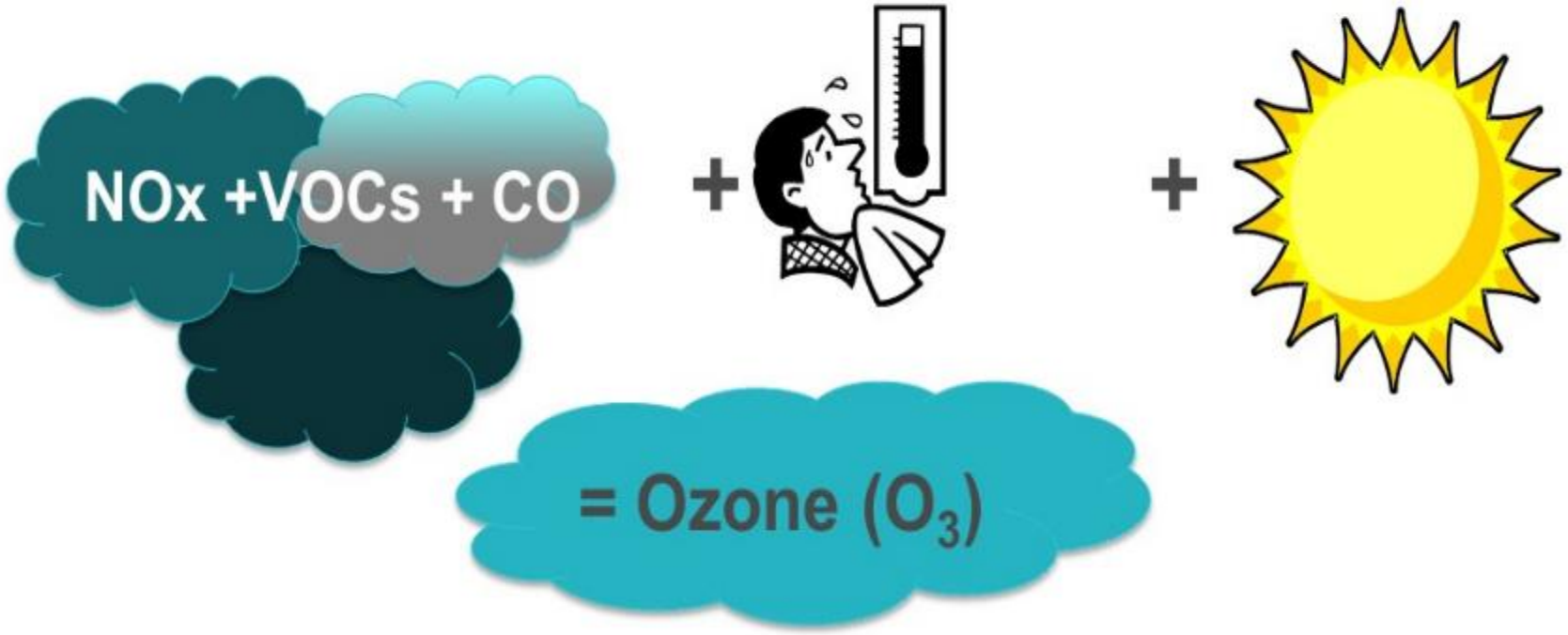


Source: ALA-SOTA

WHAT IS OZONE?

Ozone is a gas, sometimes called smog.

It is created in the atmosphere.



WHERE DOES OZONE COME FROM?

Comes from many sources, including–

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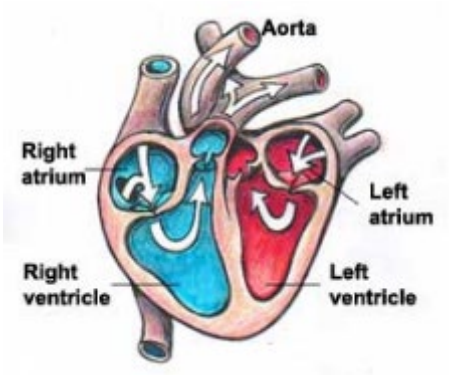
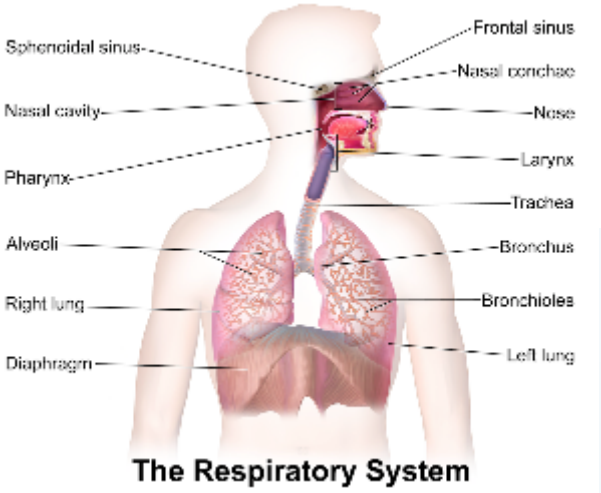
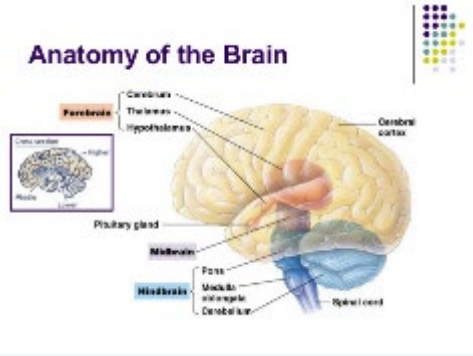
HOW DOES OZONE EFFECT US?

- Respiratory system
- Cardiovascular damage
- Neural harm
- Premature death
- Low birth rate



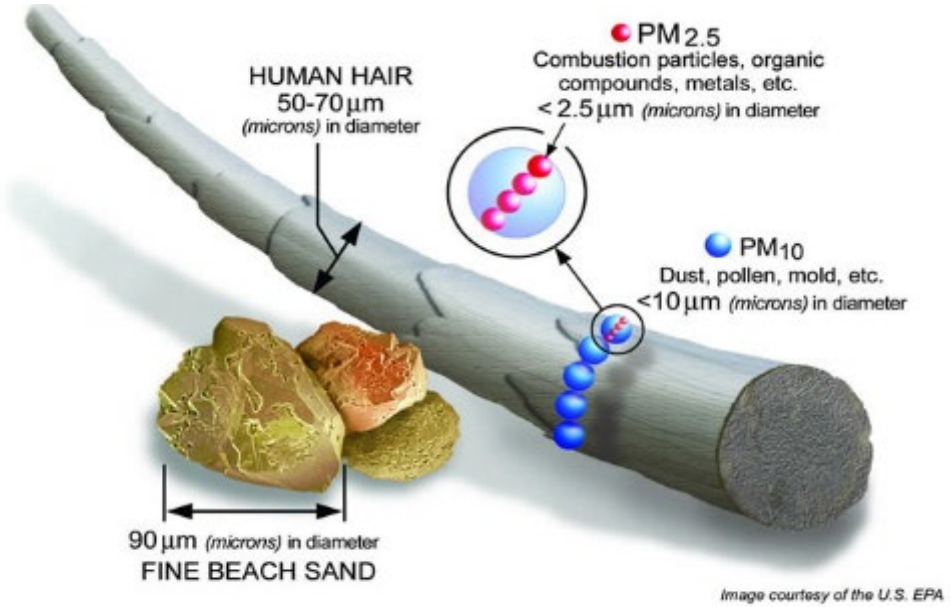


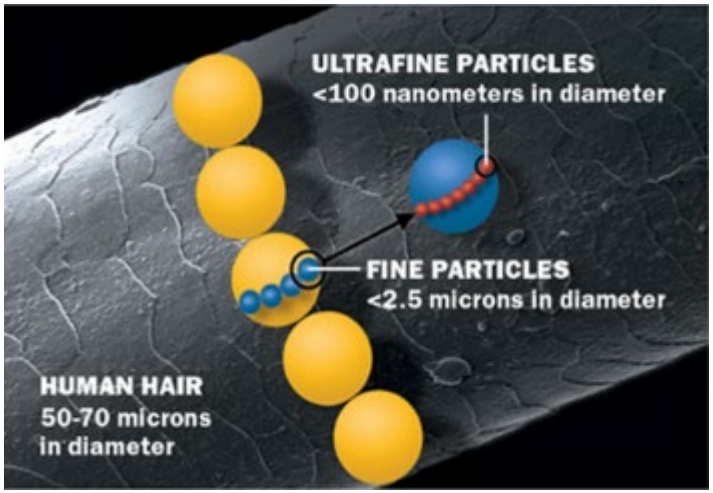
The Respiratory System



Where does particulate matter come from?

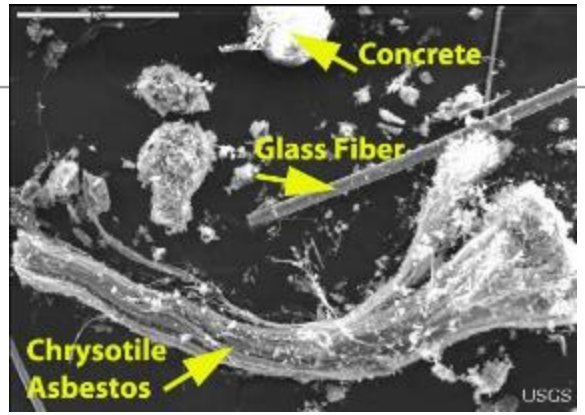
HOW SMALL IS PARTICULATE MATTER?

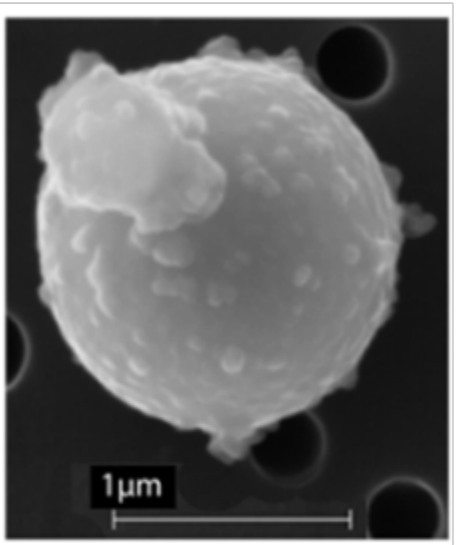




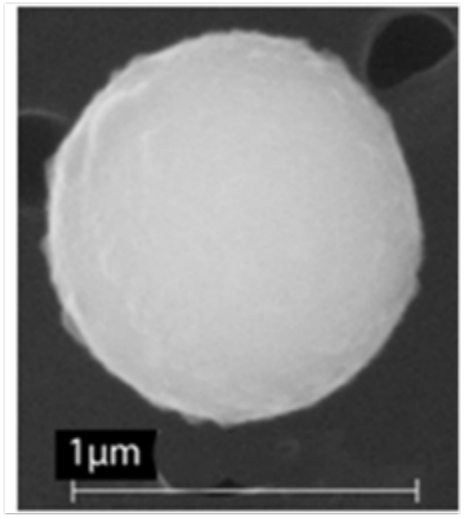
It's what you can't see which is the problem!

PARTICULATE MATTER

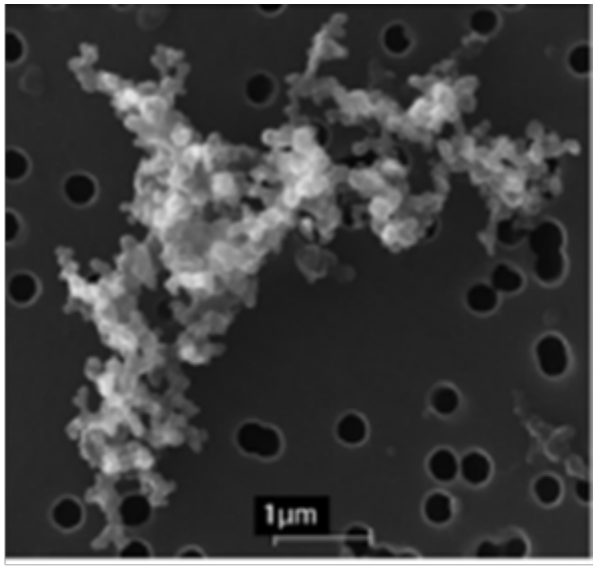




From a coal-fired power plant



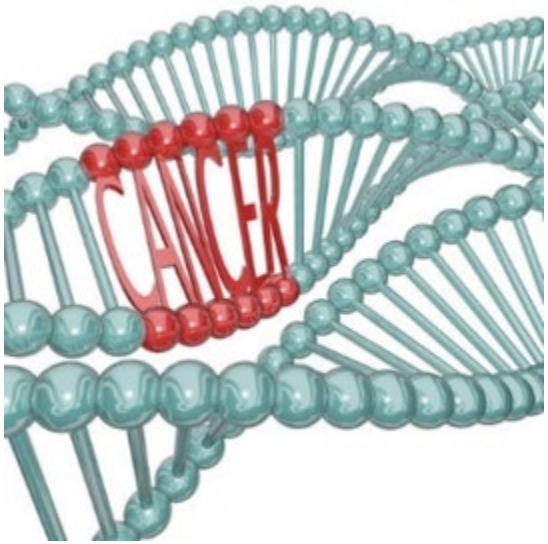
From a steel manufacturing plant



Carbon soot from a diesel engine—has lots of tiny particles

RISKS FROM TOXIC COMPONENTS

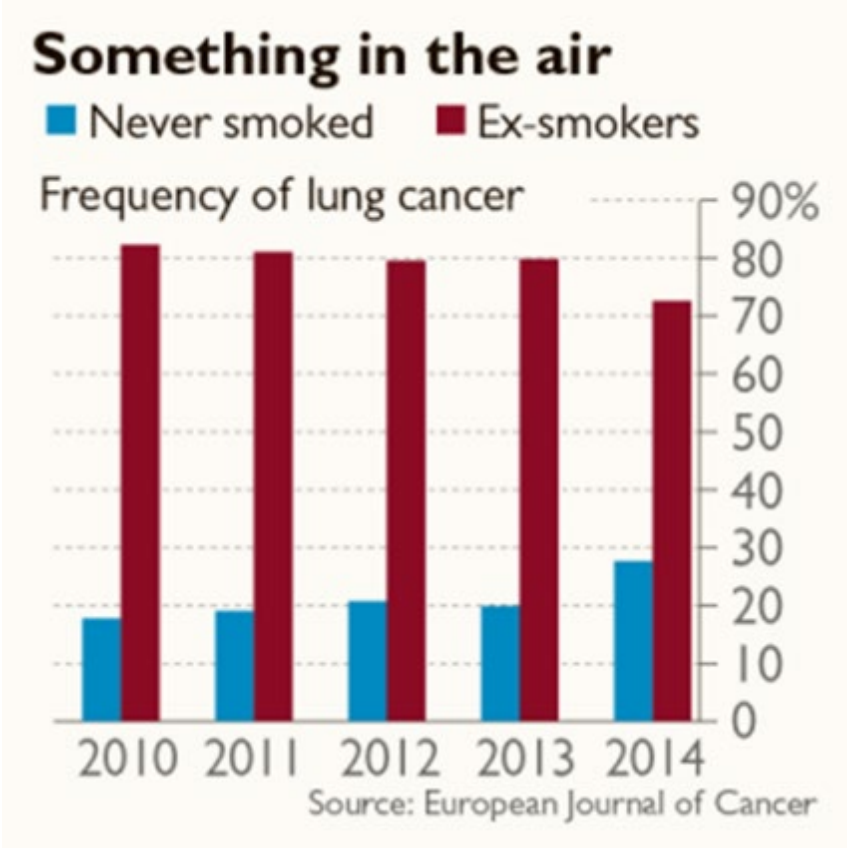
- Crude oil mixture + Chemicals
  varies raw material & refinery process
- Fuel composition vs emission
- Organic material from unburned fuel - dioxin
- Polynuclear hydrocarbons –
  toxic at low concentrations
- Heavy metals
- PM
- Persistent, Bioaccumulative, Toxic
- Sufficient evidence from epidemiologic studies to support cause and effect



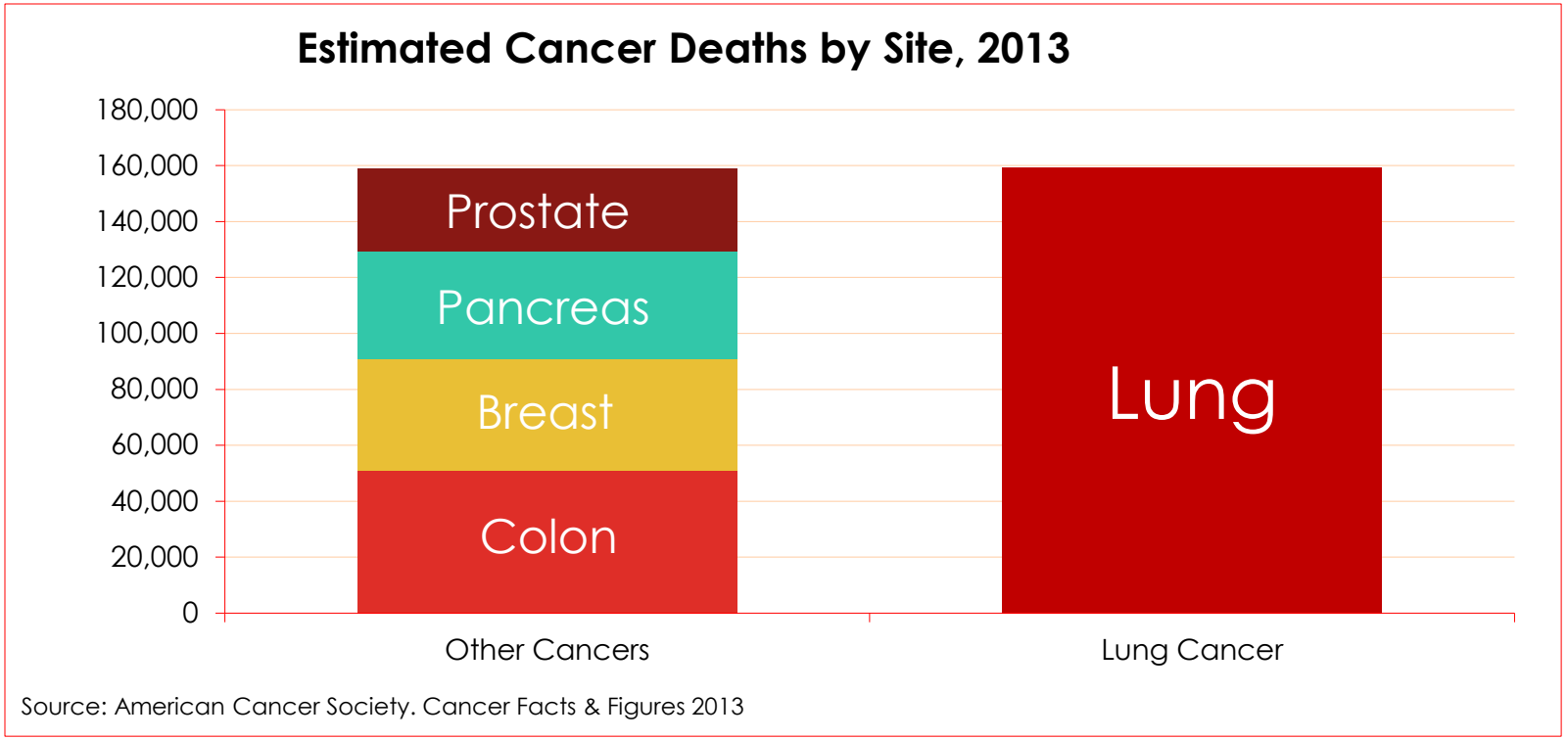
**Short term /
Long term Exposure**

LUNG CANCER

- Cigarette smoking rates have decreased
- **2/3 lung cancer occurs- never/ ex smokers**



LUNG CANCER OUTNUMBERS ALL OTHER MAJOR CANCERS



Source: American Cancer Society. Cancer Facts & Figures 2013

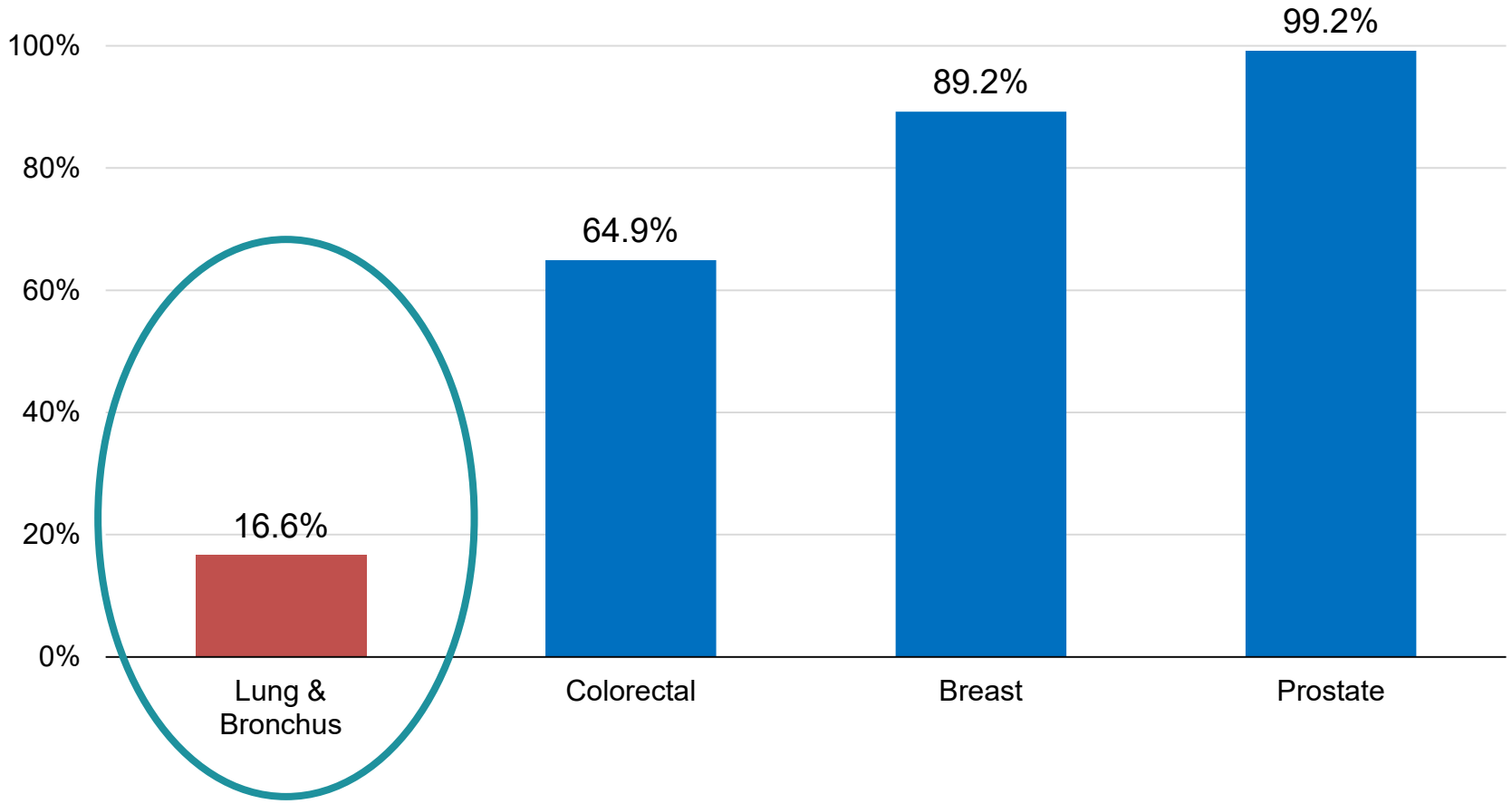
MOST LUNG CANCER IS DUE TO SMOKING
NUMBER OF SMOKERS ARE DECREASING
INCIDENCE OF LUNG CANCER IS INCREASING

CAUSES OF LUNG DISEASE & CANCER

1. **Smoking**
2. Exposure to radon gas
3. Exposure to chemicals – workplace (asbestos, silica)
4. **Air pollution – transportation/industrial sources**

1. Previous lung disease (tuberculosis)
2. Family history of lung cancer
3. Past cancer treatment
4. Previous smoking related cancer (tobacco products)
5. Lowered immunity (AIDS, HIV)

5 YEAR SURVIVAL RATES



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THE COST OF LUNG CANCER

U.S cancer care costs in the United States

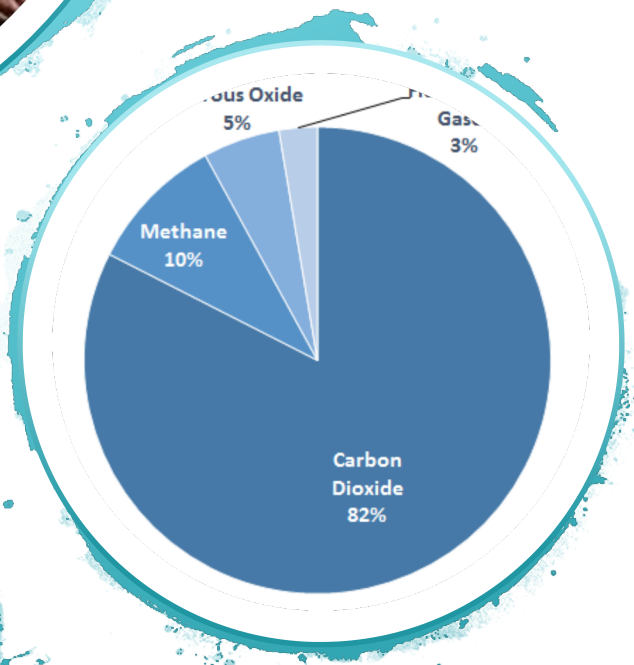
- $151 Billion in 2018
- $14.2 Billion due to lung cancer (9%)

Lost productivity (earning potential) due to early death

- $134.8 Billion in 2005
- $36.1 Billion due to lung cancer (27%)

U.S. National Institute of Health. National Cancer Institute. Cancer Trends Progress Report – Financial Burden of Cancer Care. February 2019

CLIMATE CHANGE & GREENHOUSE GASES



- **Carbon dioxide burning of fossil fuels** (coal, natural gas, & petroleum fuels)
- Result of chemical reactions (**mfg of cement**)
- Usually removed by plants as a part of biological carbon cycle (**except when in excess**)

- Aging of rubber materials, dye fading and paint erosion (at low levels long duration)
- Corrosion & damage to materials/buildings
- Effects on ecosystems
- Haze & smog
- Cloud formation
- Precipitation
- Water acidity
- Damage to crops
- Injury to vegetation

WHAT ARE OTHER ENVIRONMENTAL PROBLEMS?

HEALTH HAZARDS

Acute (short term exposure) health effects

- ✓Respiratory symptoms(irritation to eye, throat, bronchial systems
- ✓Neurological symptoms (lightheadedness)
- ✓Immunologic responses (allergens, asthma)

Chronic (long term exposure) (non-cancerous)

- ✓ Respiratory

Chronic (long term exposure) (cancerous)

- ✓ Lung cancer

LOCOMOTIVE AND GOODS MOVEMENT DIESEL EXHAUST

- Similar environmental & health concerns
- Occupational railroad worker studies
- Other concerns such as smoking
- Proximity to homes

DIESEL EXHAUST

- Hundreds of particles in gaseous/ solid form
  - ✓Particle overload
- Primary and secondary PM
- After emission: dispersion and transport into atmosphere (hours to days)
  - ✓Carbonaceous matter
  - ✓Diesel engine exhaust
  - ✓Diesel particulate matter
  - ✓Elemental carbon
  - ✓Organic carbon
  - ✓Soluble organic fraction
  - ✓Soot

BODY PROCESSES

- Inhalation (nose, mouth, lungs)
  - ✓Nose – removed by sneezing, etc.
  - ✓Nasal cells - can be translocated to blood stream
  - ✓Mouth - swallowed
  - ✓Lungs – can be removed by breathing

- Deposition
  - ✓Location
  - ✓Within the lungs
  - ✓Alveoli to blood stream
  - ✓Concentration; amount of time; genetics

DIESEL EXHAUST

On and off-road sources	Large surface area	Varies with temperature
Varies with maintenance & age of vehicle	Varies /w distance traffic and location studies	Filtered or unfiltered diesel exhaust solid particles are the worst
Diesel exhaust odor	Respiratory & Pulmonary effects	Immunological effects

DIESEL EXHAUST

Respiratory/Pulmonary effects

- Eye, throat, bronchial irritation
  - Neurophysiological (headache, nausea, vomiting, tingling of fingers, toes)
  - Chronic lung function failure

Immunological effects

Neurological effects (development, behavior & neurophysiology)

Effects on growth & development

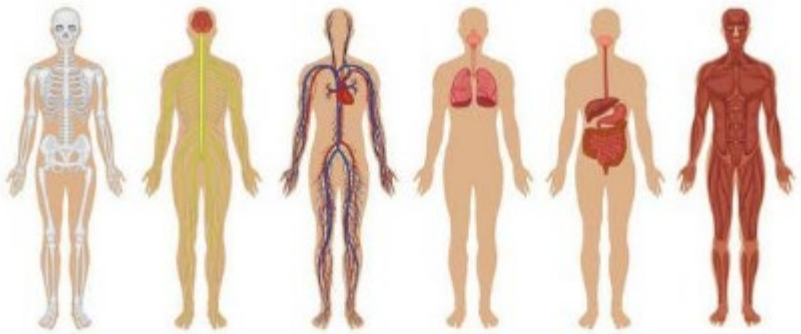
Effect on liver systems

NAAQS FOR FINE PM

- Mortality studies
- Morbidity studies
- PM10
- PM2.5
- PM ultrafine
- Volatiles associated with fine PM

STUDIES HAVE INCREASED SINCE 1990

- Cognitive function in children
- Mortality long-term effects
- Mortality short-term effects
- Diabetes
- Dementia
- Parkinson's Disease
- Multiple sclerosis



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