



Air Quality Standards and Ozone

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Standards

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Overview

- Air Quality Standards
- Process for setting National Ambient Air Quality Standards (NAAQS)
- Ground level ozone formation
- Health effects of ozone



National Ambient Air Quality Standards (NAAQS)

For the purpose of establishing national ambient air quality standards (NAAQS), EPA is required to publish a list of air pollutants that:

- Cause or contribute to air pollution which endanger public health or welfare
- Come from numerous or diverse sources



Criteria Pollutants

Six criteria pollutants:

- Particulate matter (aka particle pollution)
- Carbon monoxide
- Nitrogen dioxide
- Sulfur dioxide
- Lead
- Ozone (ground-level)



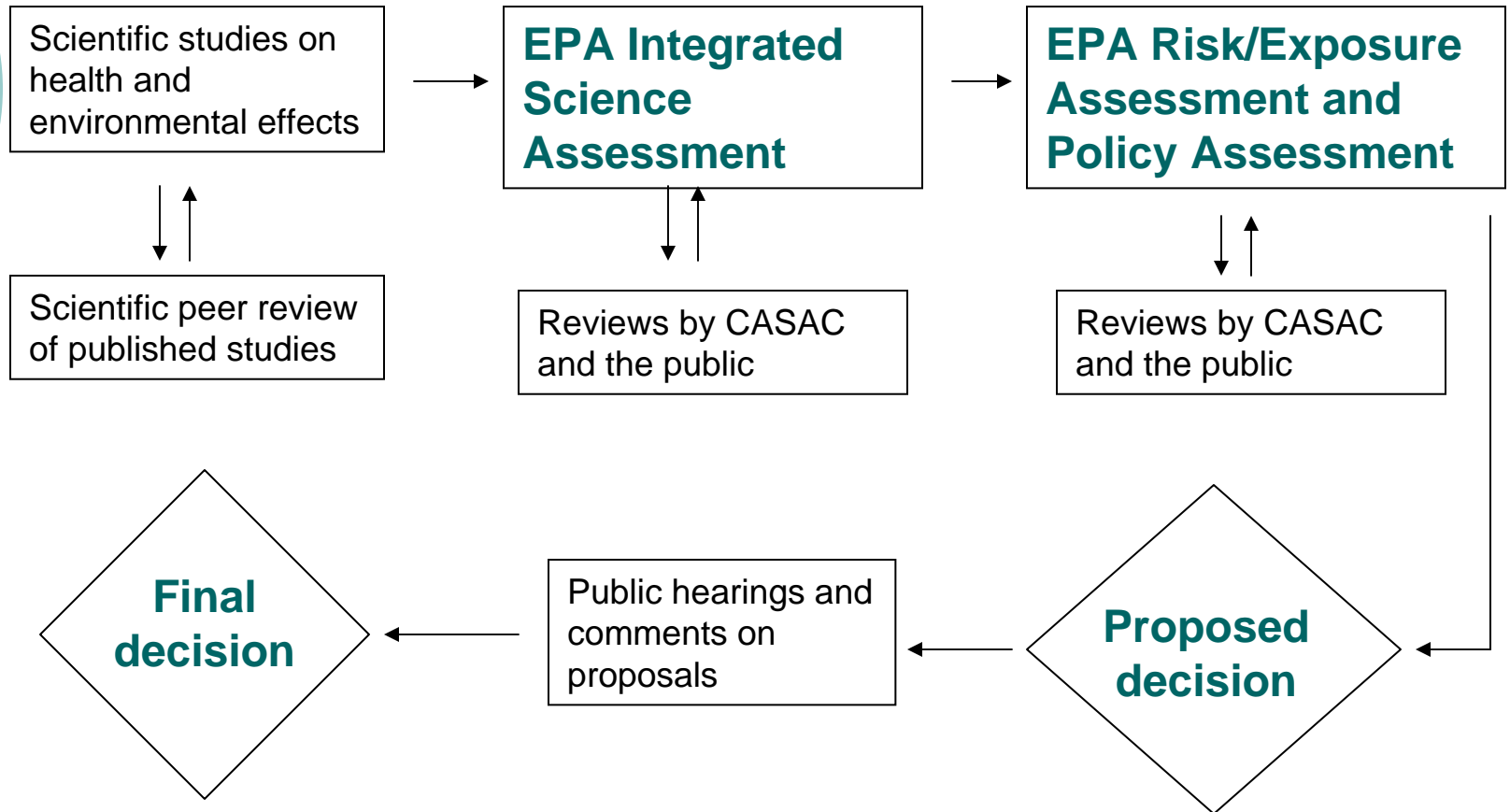
Primary vs. Secondary Standard

EPA is required to publish a national *primary* ambient air quality standard and a national *secondary* ambient air quality standard for each criteria air pollutant.

- **Primary** ambient air quality standard to protect the public health (allowing an adequate margin of safety);
- **Secondary** ambient air quality standard to protect public welfare (environment)

- Standards are reviewed approximately every 5 years. Options:
 - Leave the standard as is
 - Revoke the standard
 - Make it more stringent
 - Make it less stringent

Review Process for NAAQS



Ongoing NAAQS Review Schedule

MILESTONE	POLLUTANT						
	Lead	NO ₂ Primary	SO ₂ Primary	Ozone	NO ₂ /SO ₂ Secondary	CO	PM
Proposal	New schedule being developed	<u>Jun 26, 2009</u>	<u>Nov 16, 2009</u>	Jan 19, 2010	<u>Feb 12, 2010</u>	<u>Oct 28, 2010</u>	Jan 2011
Final	<u>Oct 15, 2008</u>	<u>Jan 25, 2010</u>	<u>Jun 2, 2010</u>	Aug 31, 2010	<u>Oct 19, 2010</u>	<u>May 13, 2011</u>	Oct 2011

Note: Underlined dates indicate court-ordered or settlement agreement deadlines.

Ozone:

Good up high, bad nearby

- Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level.
- Can be "good" or "bad" depending on its location.
- The "ozone layer" in the stratosphere protects us from solar radiation.
- At ground level, ozone is a pollutant that is a major ingredient of smog.

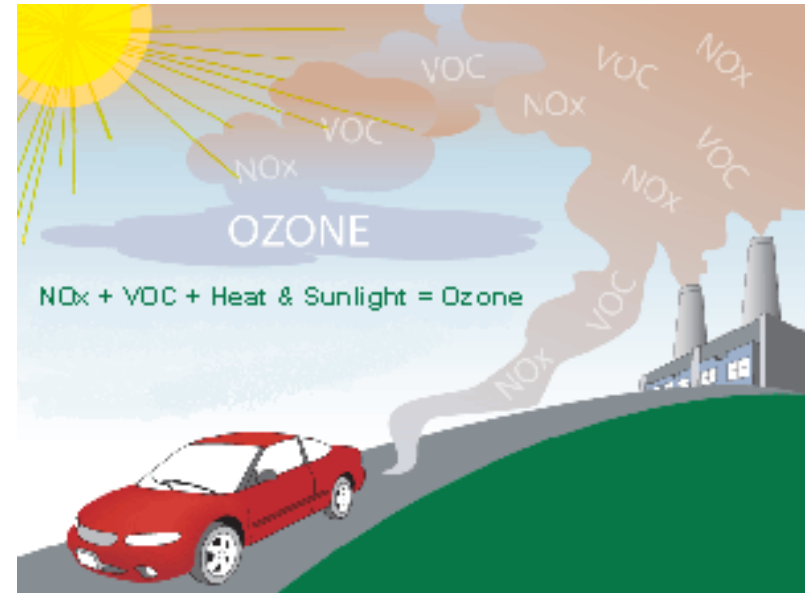


Ozone Formation

The recipe:

1. NO_x emissions from cars, trucks, power plants and factories
2. VOC emissions, from industrial processes, gasoline vapors, dry cleaning, many consumer products
3. Cook in sunlight =

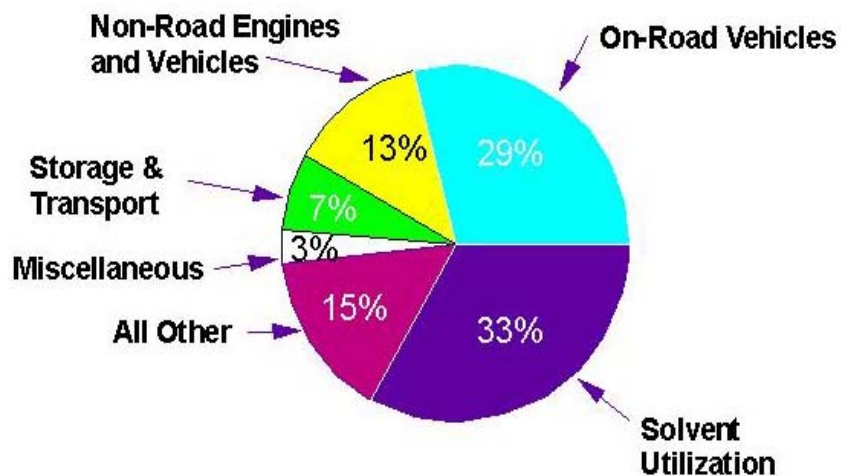
OZONE FORMATION



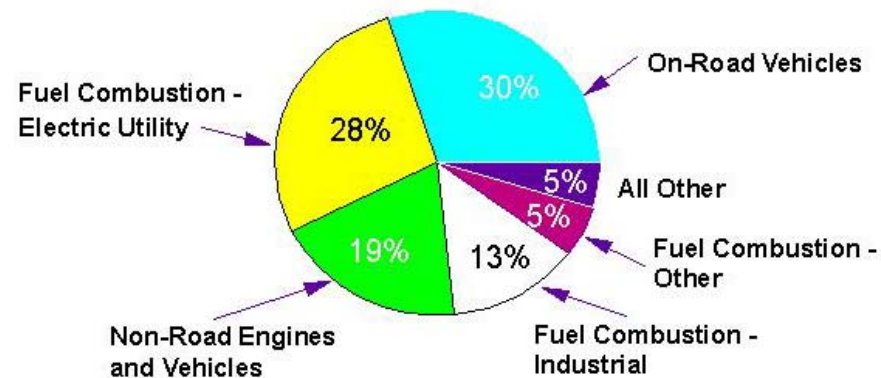
Ozone season:
April – October

Where Do NOx and VOCs Come From?

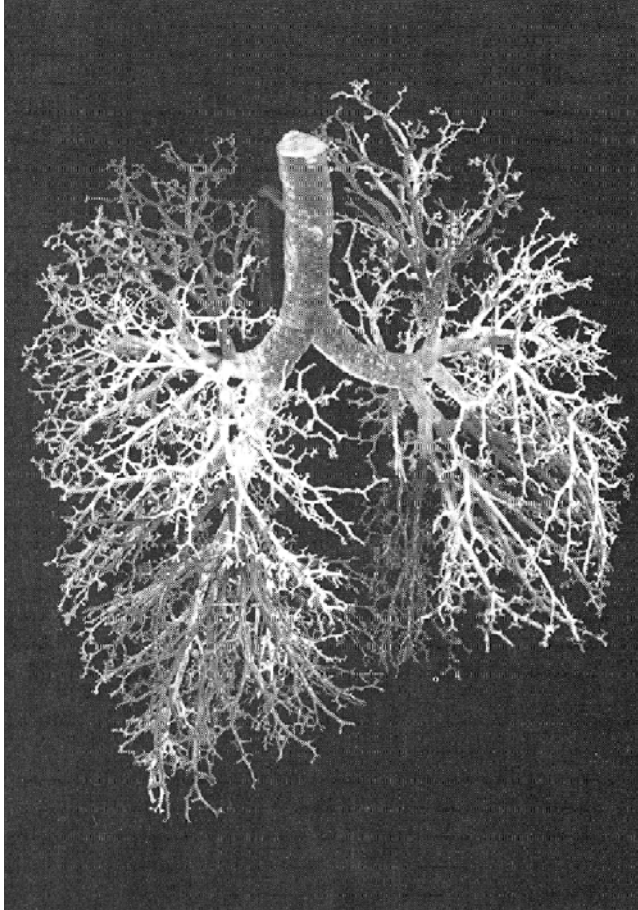
VOCs



NOx



Human Lung



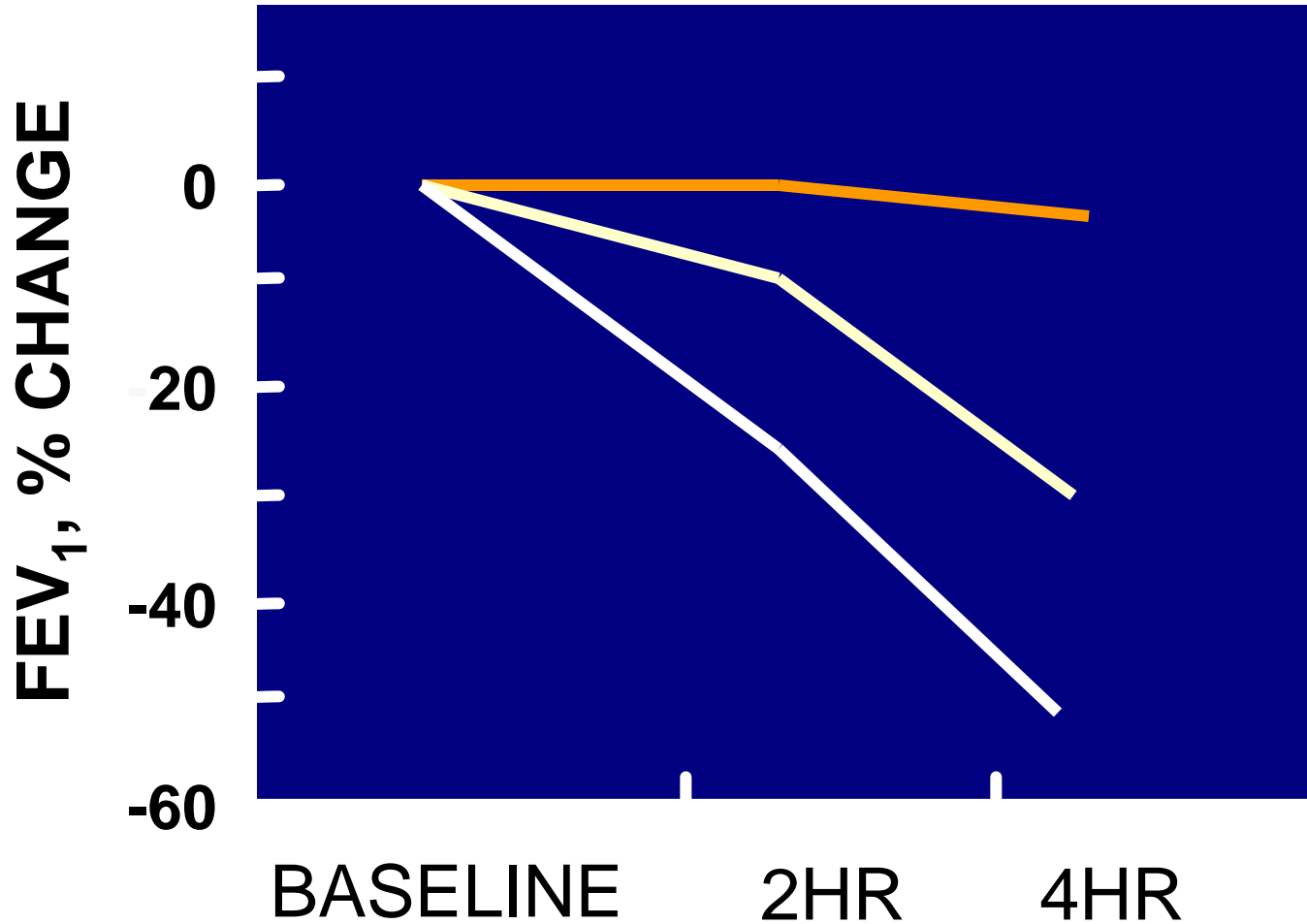
- Air conducting
 - Trachea
 - Bronchi
 - Bronchioles
- Gas exchange
 - Respiratory bronchioles
 - Alveoli

Ozone Irritates Airways

- Symptoms
 - Cough
 - Sore or scratchy throat
 - Pain with deep breath
 - Fatigue
- Rapid onset
- People with and without asthma can experience shortness of breath and asthma-like symptoms
 - Effects greater in people with asthma



Ozone Reduces Lung Function



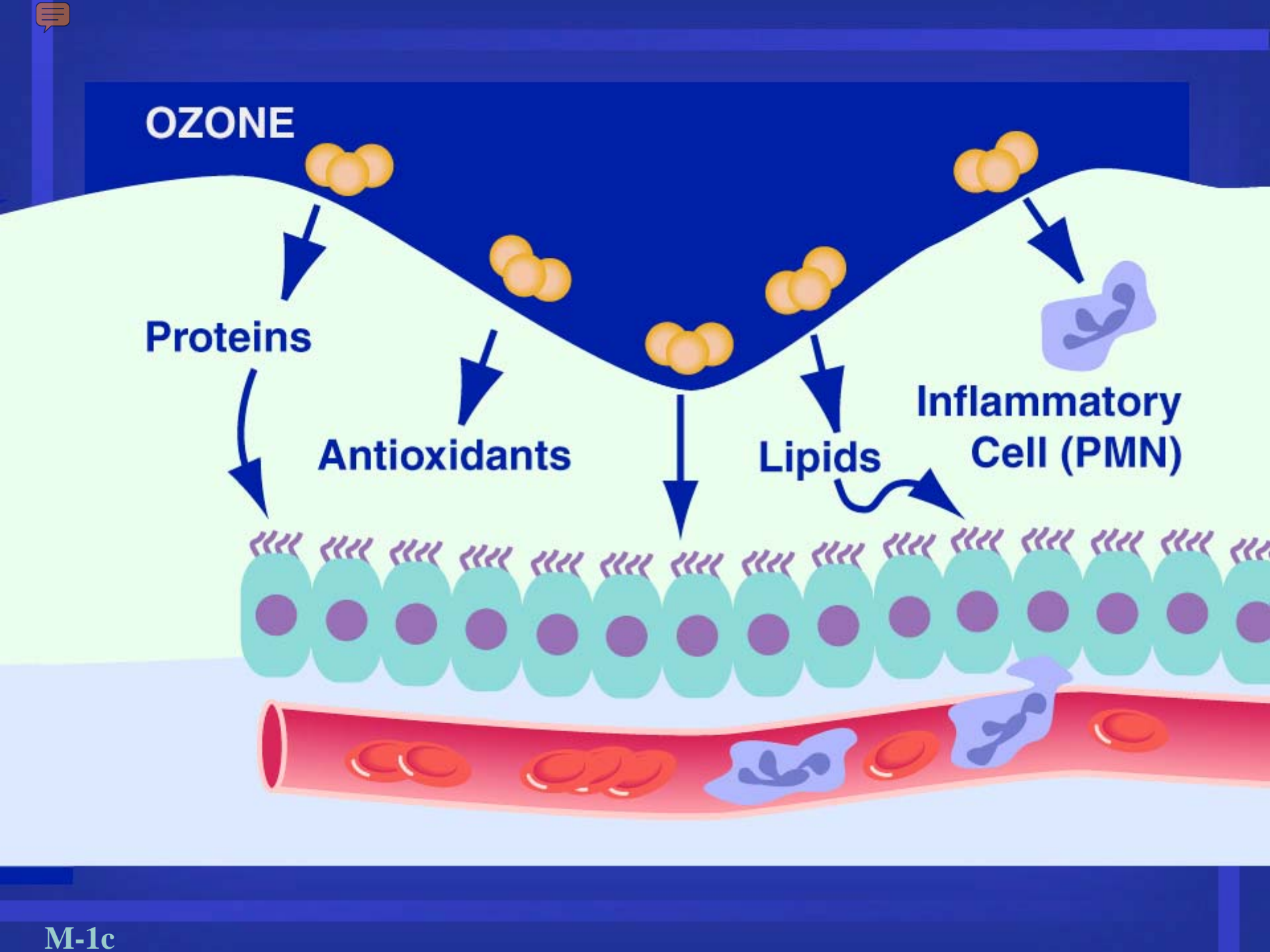
OZONE

Proteins

Antioxidants

Lipids

Inflammatory Cell (PMN)





Ozone and health

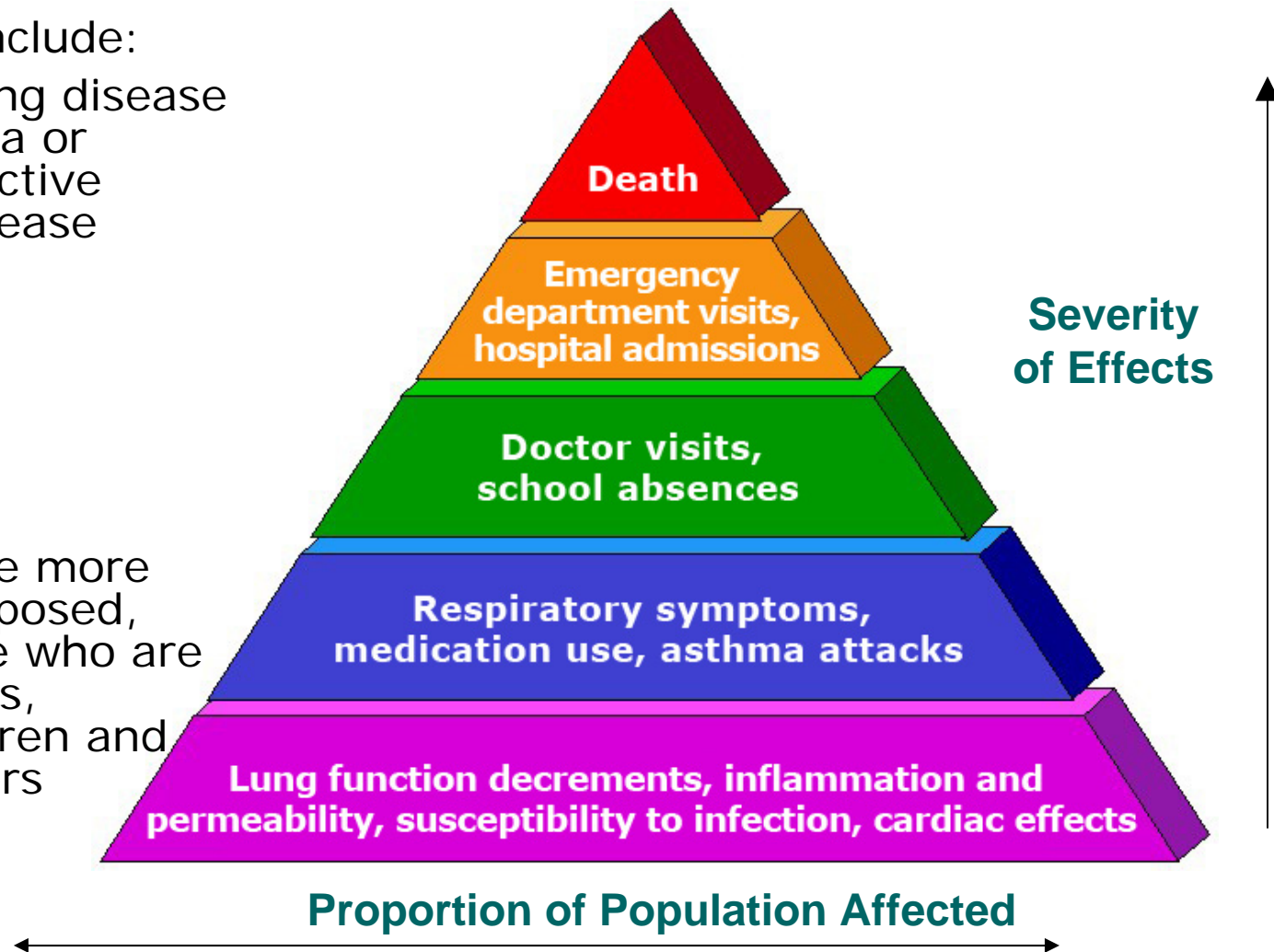
Children are at increased risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors.



Ozone Health Impacts: “Pyramid of Effects”

At-risk groups include:

- People with lung disease such as asthma or chronic obstructive pulmonary disease (COPD)
- Children
- Older adults
- People who are more likely to be exposed, such as people who are active outdoors, including children and outdoor workers





Contact Information

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