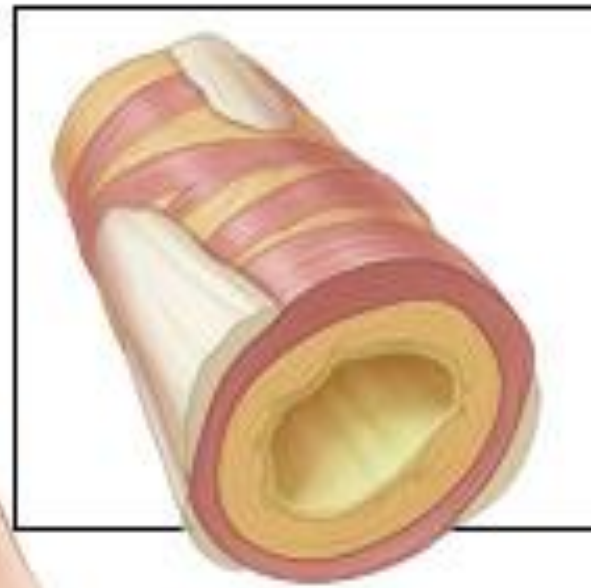
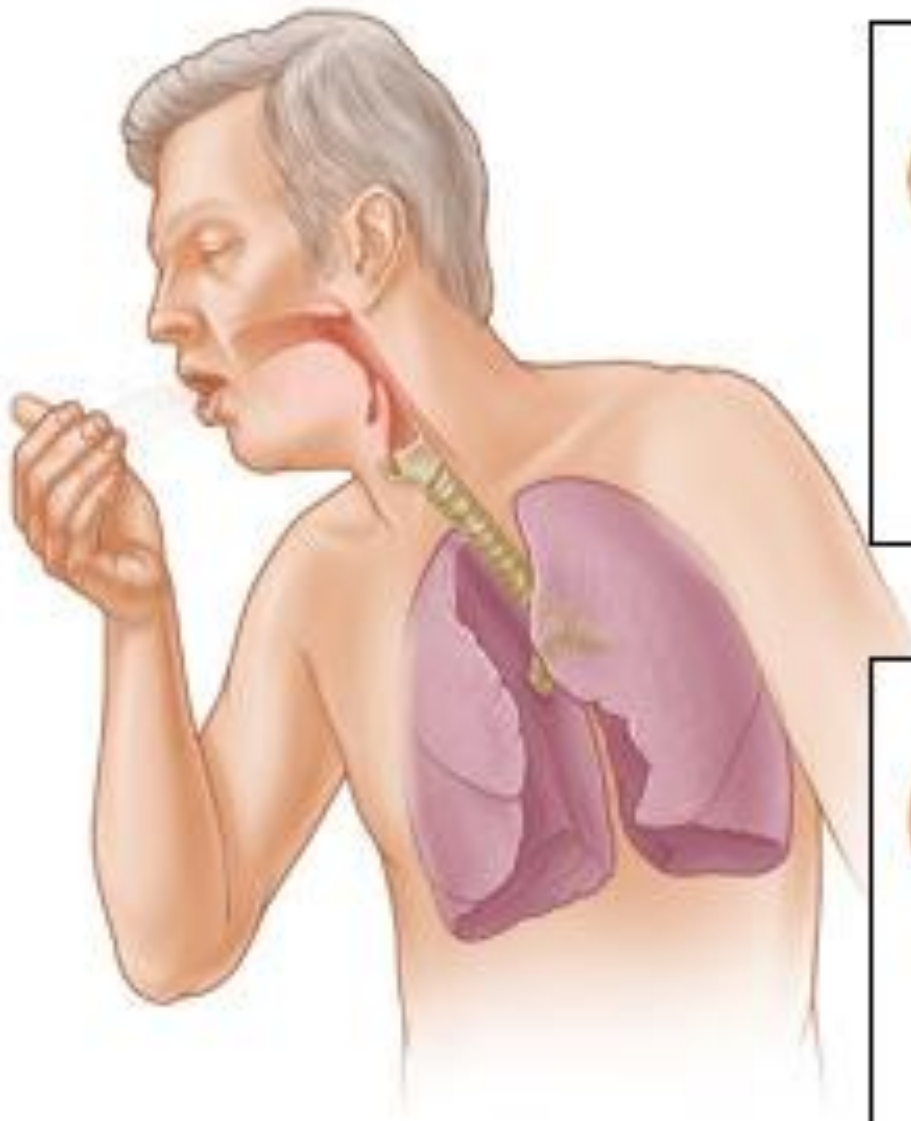


Health Effects of Air Pollution

Dr Jackie Hyland
CPHM, NHS Fife

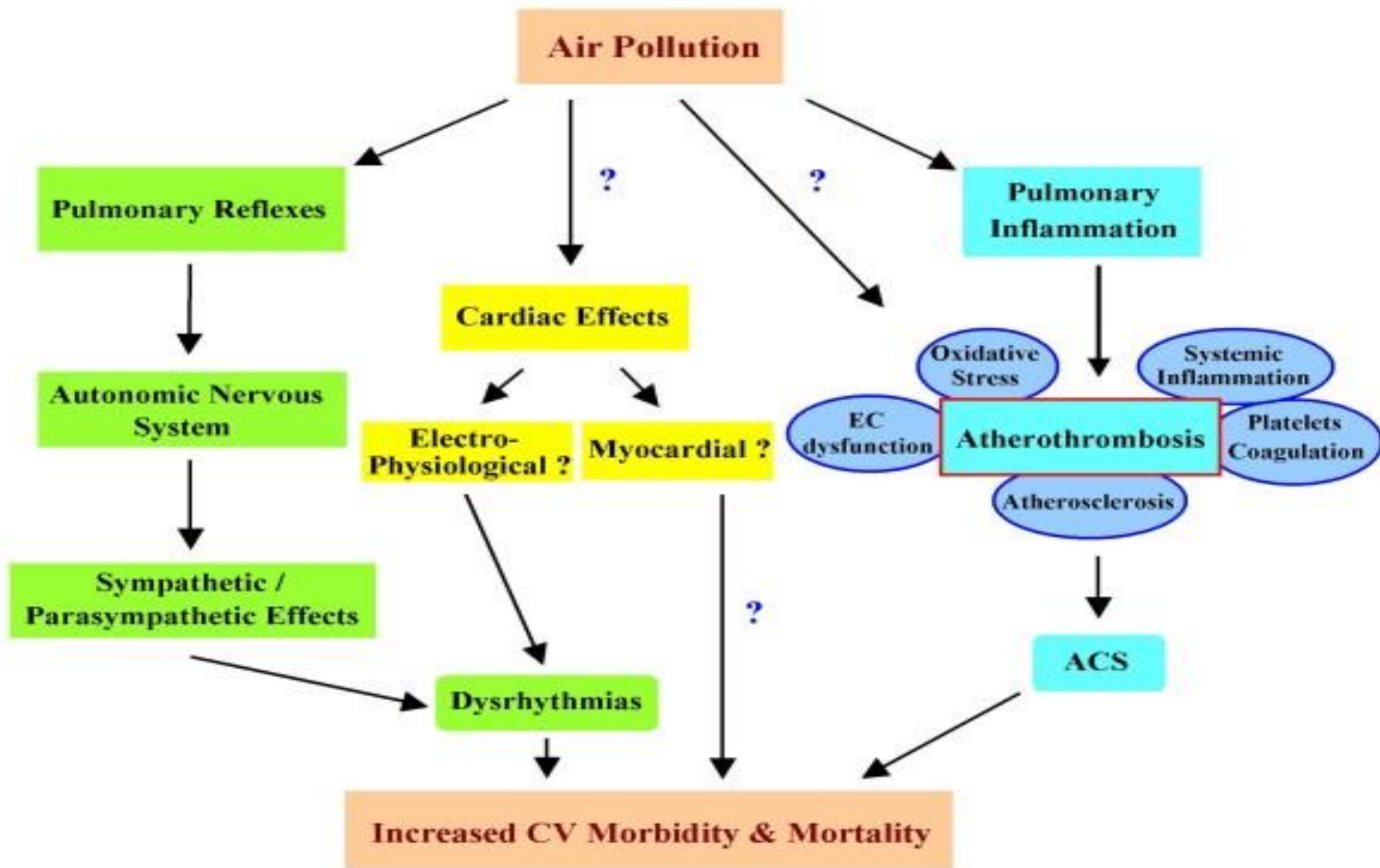


**Normal
bronchial
tube**

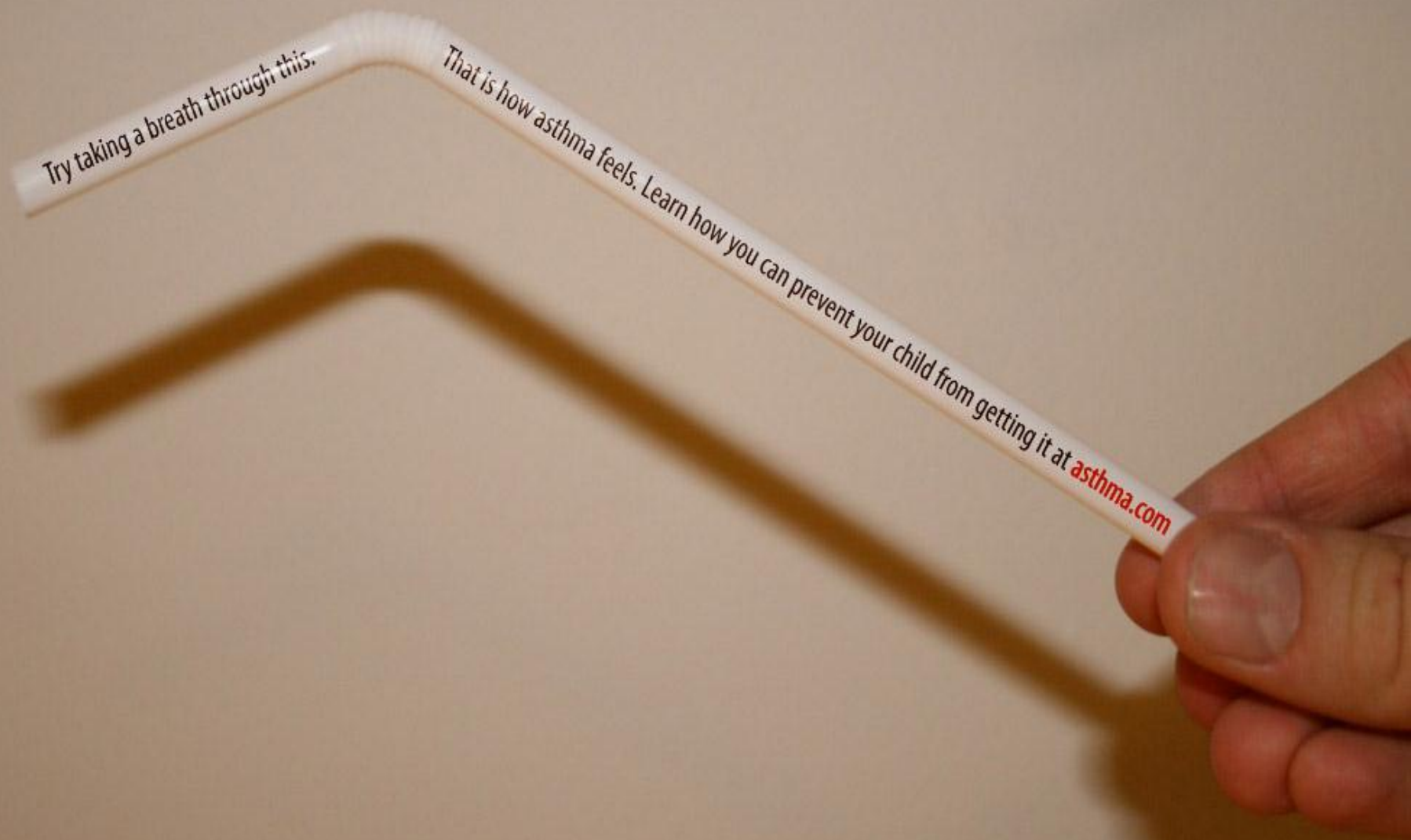


**Inflamed
bronchial
tube**

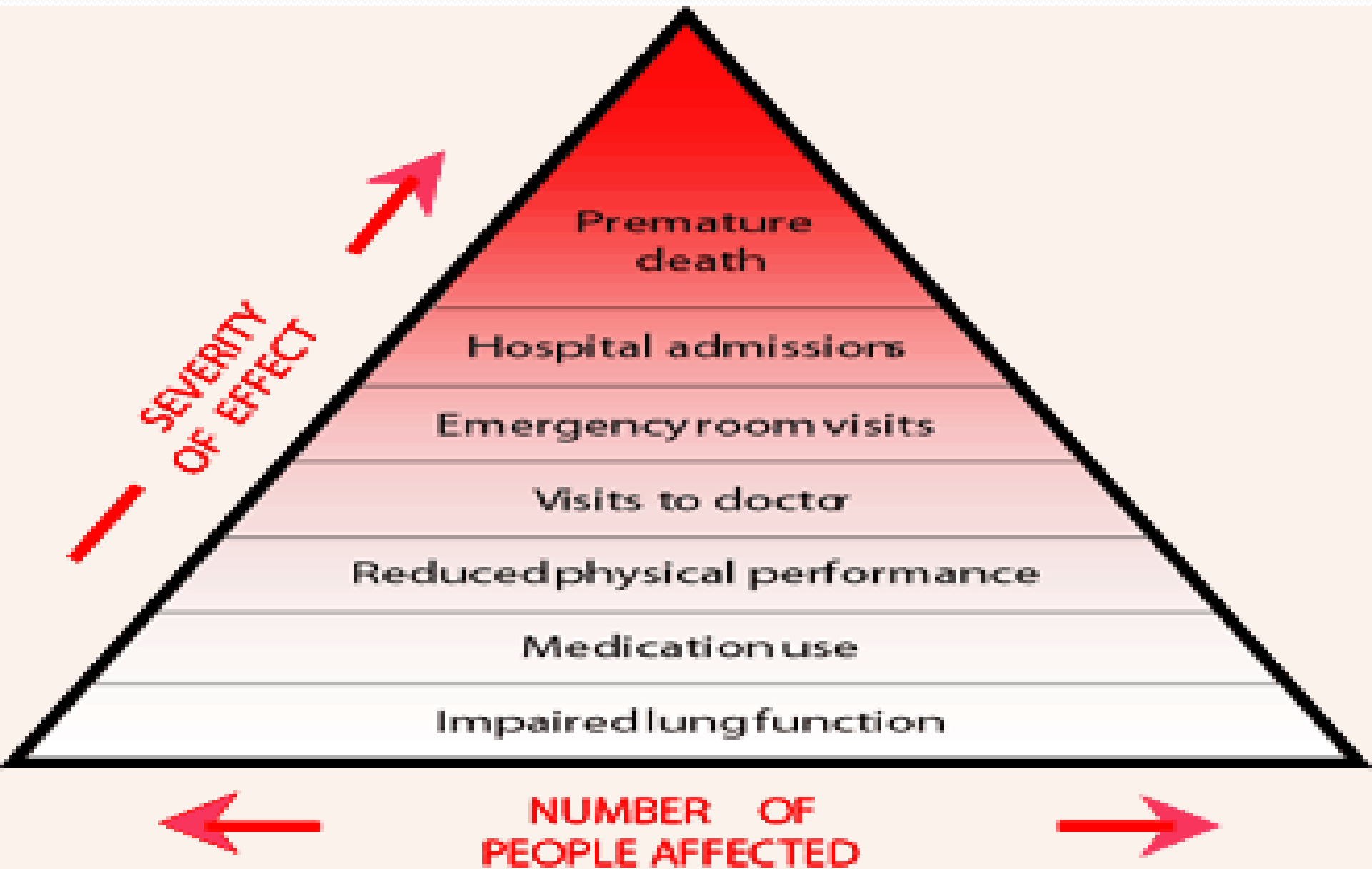
© Healthwise, Incorporated

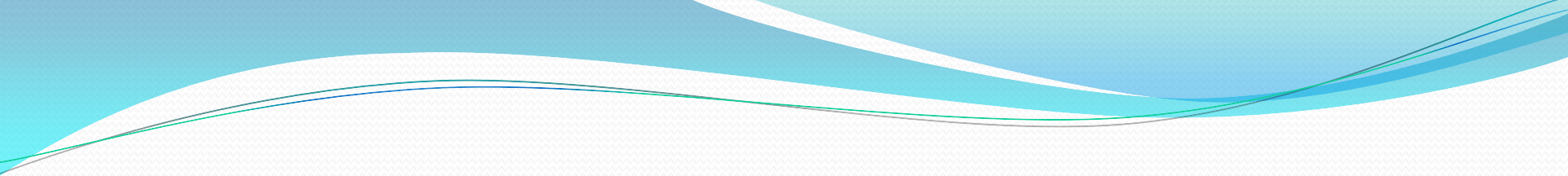


Particulate matter and atherosclerosis: role of particle size, composition and oxidative stress. Jesus A Araujo¹ and Andre E Nel. Particle and Fibre Toxicology <http://www.particleandfibretoxicology.com/content/6/1/24>



Air Pollution Health Effect Pyramid





Air pollution is prematurely killing 13,000 people a year in Britain compared with fewer than 2,000 deaths a year from road accidents.

Of these, cars and lorries are thought to be responsible for 7,000 deaths, aviation almost 2,000, power plants 1,700 with the rest coming from shipping, factories and domestic emissions

The Guardian John Vidal, environment editor [guardian.co.uk](http://www.guardian.co.uk), Friday 20 April 2012 <http://www.guardian.co.uk/environment/2012/apr/20/air-pollution-killing-13000-people-year>

Air pollution in London

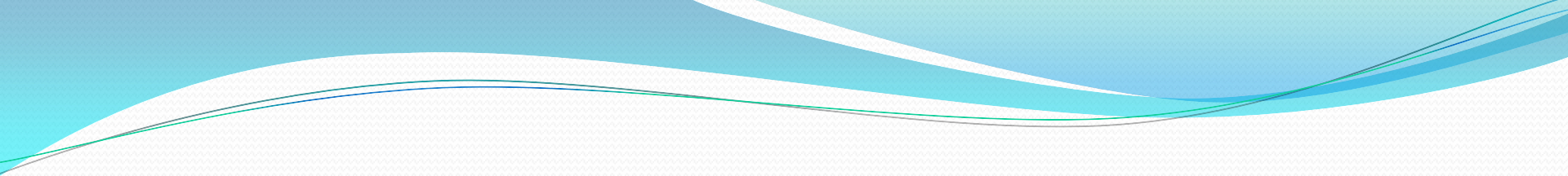
December 2012

http://www.london.gov.uk/sites/default/files/Air%20pollution%20issues%20paper%20pdf_0.pdf

- Thousands of Londoners per year die early as a result of long-term exposure to air pollution
- Over 4000 extra deaths each year in London are attributable to one kind of pollutant, microscopic airborne particles
- It is estimated there are over 4,000 extra deaths each year in London from particulates and health costs are estimated at up to £20 billion a year – twice the cost of obesity
- The man-made majority of these particles is responsible for a proportion of all deaths in London boroughs ranging from around 6% in the least polluted outer suburbs to over 8% in the most polluted boroughs of inner London

Air Pollution London

- Air pollution contributes to a range of lifeshortening lung and heart conditions
- It can also impair lung development in children
- Links have also been reported to breast cancer, diabetes and premature and low birth weight babies
- The health costs of air pollution in the UK have been estimated at up to £20 billion a year – twice as much as obesity

- 
- Ultra-fine particles are able to provoke alveolar inflammation, with release of mediators capable, in susceptible individuals, of causing exacerbations of lung disease and of increasing blood coagulability, thus also explaining the observed increases in cardiovascular deaths associated with urban pollution episodes.

Particulate air pollution and acute health effects. *The Lancet*, Volume 345, Issue 8943, Pages 176-178
A. Seaton, D. Godden, W. MacNee, K. Donaldson





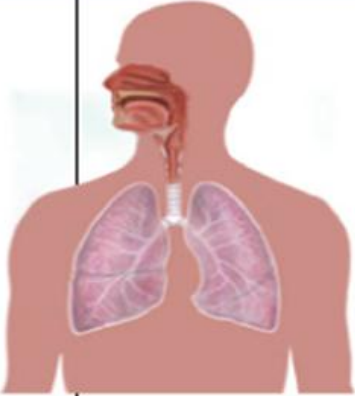
<http://ciaraquinn.wordpress.com/>

- Long-term exposure to ambient PM_{10} and NO_2 was associated with increased mortality rates.

[Joachim Heinrich](#), et al .Long-term exposure to NO_2 and PM_{10} and all-cause and cause-specific mortality in a prospective cohort of women [Joachim Heinrich](#), et al *Occup Environ Med* 2013;70:179-186

- ... urban areas, we found that hay fever, symptoms of allergic rhinitis, wheezing, sensitization against pollen, house dust mites or cats, and milk or eggs were associated with outdoor NO_2 . The results indicate that traffic-related air pollution leads to increased prevalence of atopic sensitizations, allergic symptoms, and diseases.

Kramer U et al. Traffic-Related Air Pollution Is Associated with Atopy in Children Living in Urban Areas. *Epidemiology*: January 2000 - Volume 11 - Issue 1 - pp 64-70

Stage: Age:	Newborn 0–2 mos	Infant/Toddler 2 mos–2 yrs	Young Child 2–6 yrs	School-Age Child 6–12 yrs	Adolescent 12–18 yrs
Lung development:					
	Alveolar development				
	High respiratory rate				
Air pollution risks:			Increasing lung volume		
	Respiratory death				
			Chronic cough and bronchitis		
			Reduced lung function		
			Wheezing and asthma attacks		
				Respiratory-related school absences	

*Air pollution exposure has also been more recently linked to respiratory symptoms and illnesses in early life including cough, bronchitis, wheeze and ear infections



**Mothers
& Others**
FOR CLEAN AIR

- How can you reduce your child's exposure to air pollution at school?
- Guidelines to reduce exposure on "bad air" days
- Reducing toxic diesel school bus emissions
- Idling reduction
- Indoor air pollution resources

<http://mothersandothersforcleanair.org/>



Sunlight

Ground Level Ozone Formation



**Nitrogen
Oxides**



**Volatile
Organic
Compounds**

=



Ozone

<http://www.epa.gov/climatechange/impacts-adaptation/health.html>

**Pollutants "bake" together in
direct sunlight forming ozone.**

Climate change

Warmer climate

Warmer average
temperature

Stagnant air
conditions

more asthma
attacks,
respiratory
illnesses,
emergency room
trips, and
premature deaths.



Thank-you