The Air We Breath...

Particle deposition in the airways.

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CROSH





The Lungs

23 branching generations

0-8 trachea and bronchi

- Conduction
- 9-16 bronchioles
- Conduction & Diffusion
- 16-23
- Alveolar region diffusion







Particle Deposition



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Biology of individual

Different people have different tidal volumes, lung volumes & breathing rates

EXPOSURE → DOSE → RESPONSE

Deposition increases with: increasing tidal volume (larger person = larger tidal volume); increased resistance; and mouth versus nose breathing



Particle Clearance







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Ambient exposure

https://www.epa.ie/air/qualit	y/index/	Five air pollutants which can			arm your health:			
			Ozone	Nitrogen dioxide	Sulphur dioxide	PM _{2.5} particles	PM ₁₀ particles	
	Four bands of air quality:	Index (1-10):	Running 8- hour mean (µg/m³)	1-hour mean (μg/m³)	1-hour mean (μg/m³)	Running 24-hour mean (µg/m³)	Running 24-hour mean (µg/m³)	5 r
		1	0-33	0-67	0-29	0-11	0-16	
	Good air quality	2	34-65	68-134	30-59	12-23	17-33	
		3	67-100	135-200	60-89	24-35	34-50	
	Fair air quality	4	101-120	201-267	90-119	36-41	51-58	
		5	121-140	268-334	120-149	42-47	59-66	
		6	141-160	335-400	150-179	48-53	67-75	
	Poorair quality	7	161-187	401-467	180-236	54-58	76-83	
		8	188-213	468-534	237-295	59-64	84-91	
		9	214-240	535-600	296-354	65-70	92-100	CROSH
								CRSST
	Very Poor air quality	10	241 or more	601 or more	355 or more	71 or more	101 or more	centro for responsible schapelices (serve and beatting all persolute laters) all persolute laters) all (there is a serve and a









Mechanisms of DPM damage













Organization	Animal Data	Human Data	Overall		
NIOSH '88	Confirmatory	Limited	Potential Occupational carcinogen		
IARC '89	Sufficient	Limited	Probably carcinogenic to Humans		
IPCD '96	Not evaluated	Not evaluated	Probably carcinogenic to humans		
EPA '98	Demonstrated carcinogenicity	Consistent evidence for a causal association	DPM classified as a toxic air contaminant		
NTP '00	Supporting animal & mechanistic data	Elevated lung cancer in occupationally exposed groups	DPM-reasonable anticipated to be a carcinogen		
EPA '02	Adequate evidence for carcinogenicity	Probable human carcinogen	Probably human carcinogen (Group B1) "Likely to be carcinogenic to humans by inhalation" and this evaluation applies to environmental exposures."		
IARC '12	Adequate evidence for carcinogenicity	Human Carcinogen	Designated human carcinogen (Group 1)		
Adapted from: Foster & Costa: Lung Biology in Health and Disease; Vol 204					









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PREVENTION THROUGH RESEARCH