

Comparative Modeling of Exposure to Airborne Nanoparticles Released by Consumer Spray Products

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Supporting information

Supplemental Table 1: MPPD parameters for the exposure scenario consumer, upright.

<i>Airway Morphometry</i>			
Species	Human		
Model	Yeh / Schum 5-Lobe		
Flow	Uniform Expansion		
FRC	3300 ml		
URT Volume	50 ml		
Exposure Condition			
Constant Exposure	Acceleration of Gravity	981.0 cm/s ²	
	Body Orientation	Upright	
	Body Orientation α	0.0°	
	Body Orientation β	0.0°	
	Body Orientation γ	0.0°	
	Aerosol	x mg/m ³	
	Concentration	(back calculated from 10 ⁶ particles/cm ³)*	
	Breathing Frequency	19 per minute*	
	Tidal Volume	1000 ml*	
	Inspiratory Fraction	0.5	
	Pause Fraction	0	
	Breathing Scenario	Oronasal-Normal Augmenter*	
Deposition/Clearance			
Deposition Only			

Abbreviations used: FRC, functional residual capacity; URT, upper respiratory tract. * denotes non-default values.

Supplemental Table 2: MPPD parameters for the exposure scenario consumer, forward leaning.

Airway Morphometry		
Species	Human	
Model	Age-Specific 5-Lobe*	21 Years Old*
Flow	Uniform Expansion	
FRC	2123.75 ml	
URT Volume	42.27 ml	
Exposure Condition		
Constant Exposure	Acceleration of Gravity	981.0 cm/s ²
	Body Orientation	Leaning Forward*
	Body Orientation α	45.0°
	Body Orientation β	0.0°
	Body Orientation γ	0.0°
	Aerosol	x mg/m ³
	Concentration	(back calculated from 10 ⁶ particles/cm ³)*
	Breathing Frequency	14 per minute
	Tidal Volume	477.2 ml
	Inspiratory Fraction	0.5
	Pause Fraction	0
	Breathing Scenario	Oronasal-Normal Augmenter*
Deposition/Clearance		
Deposition Only		

Abbreviations used: FRC, functional residual capacity; URT, upper respiratory tract. * denotes non-default values.

Supplemental Table 3: MPPD parameters for the exposure scenario bystander, child.

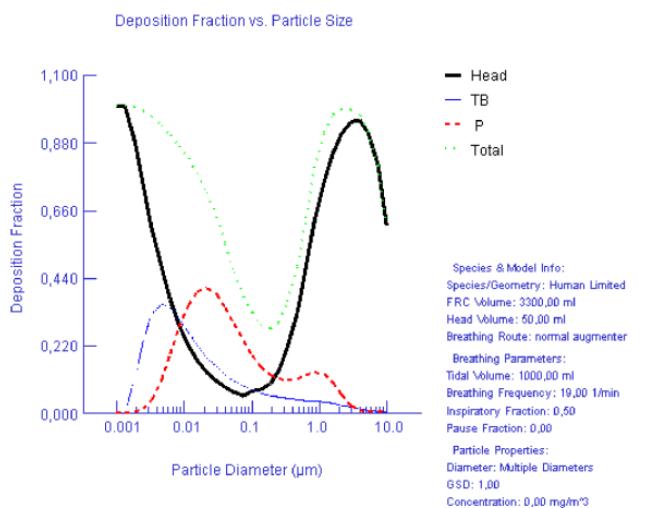
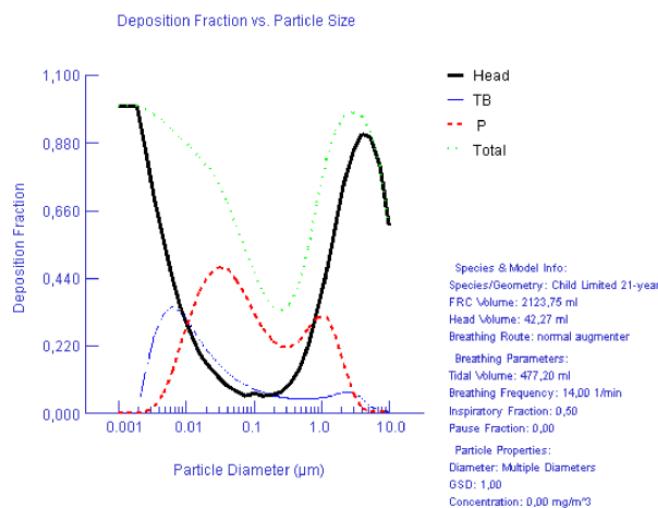
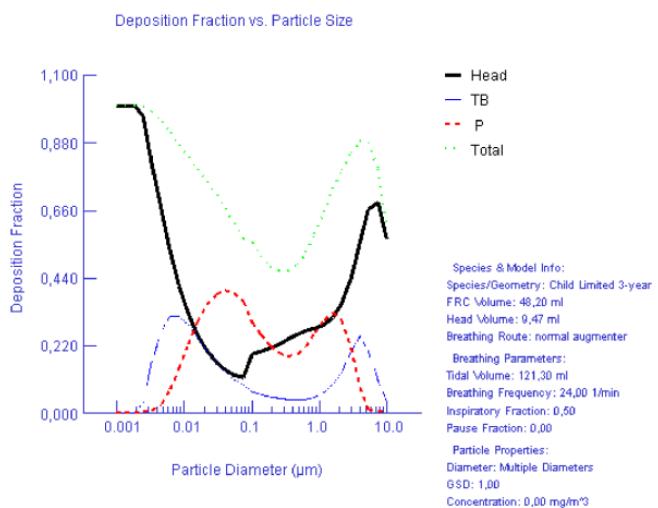
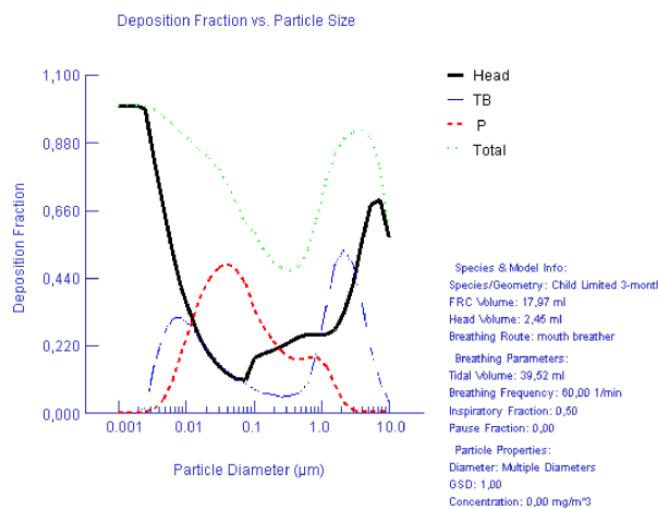
Airway Morphometry		
Species	Human	
Model	Age-Specific 5-Lobe*	3 Years Old*
Flow	Uniform Expansion	
FRC	48.20 ml	
URT Volume	9.47 ml	
Exposure Condition		
Constant Exposure	Acceleration of Gravity	981.0 cm/s ²
	Body Orientation	Upright
	Body Orientation α	0.0°
	Body Orientation β	0.0°
	Body Orientation γ	0.0°
	Aerosol	x mg/m ³
	Concentration	(back calculated from 10 ⁶ particles/cm ³)*
	Breathing Frequency	24 per minute
	Tidal Volume	121.3 ml
	Inspiratory Fraction	0.5
	Pause Fraction	0
	Breathing Scenario	Oronasal-Normal Augmenter*
Deposition/Clearance		
Deposition Only		

Abbreviations used: FRC, functional residual capacity; URT, upper respiratory tract. * denotes non-default values.

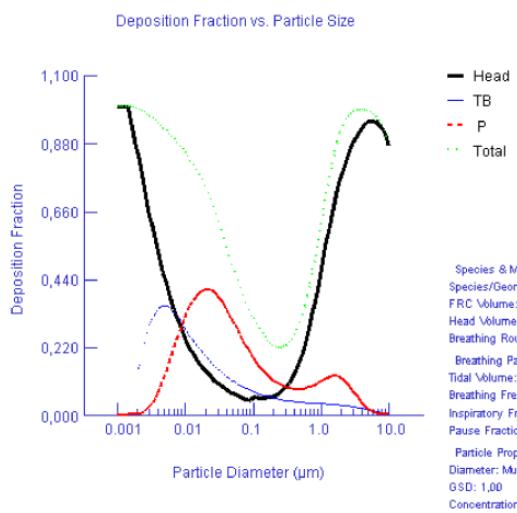
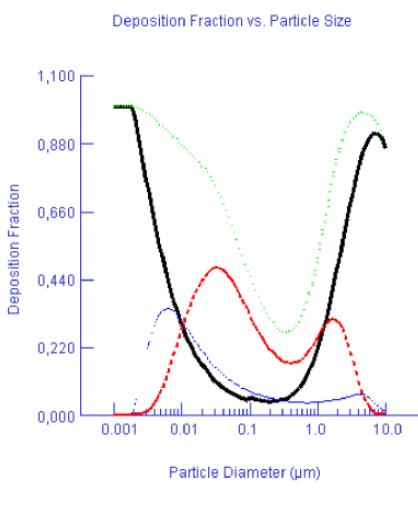
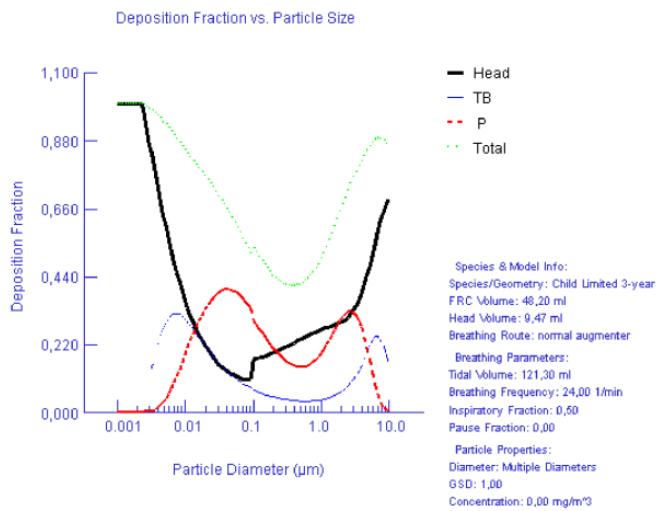
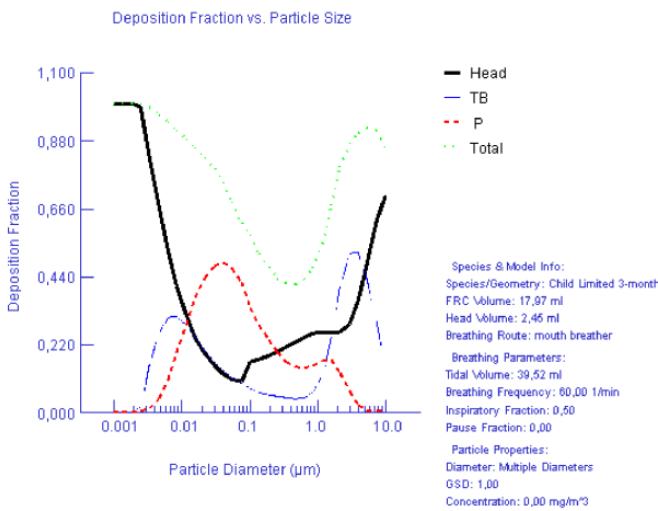
Supplemental Table 4: MPPD parameters for the exposure scenario infant, lying.

Airway Morphometry		
Species	Human	
Model	Age-Specific 5-Lobe*	3 Months Old
Flow	Uniform Expansion	
FRC	17.97 ml	
URT Volume	2.45 ml	
Exposure Condition		
Constant Exposure	Acceleration of Gravity	981.0 cm/s ²
	Body Orientation	On Back*
	Body Orientation α	90.0°
	Body Orientation β	0.0°
	Body Orientation γ	0.0°
	Aerosol	x mg/m ³
	Concentration	(back calculated from 10 ⁶ particles/cm ³)*
	Breathing Frequency	60 per minute*
	Tidal Volume	39.52 ml*
	Inspiratory Fraction	0.5
	Pause Fraction	0
	Breathing Scenario	Oronasal-Mouth Breather*
Deposition/Clearance		
Deposition Only		

Abbreviations used: FRC, functional residual capacity; URT, upper respiratory tract. * denotes non-default values.

A**B****C****D**

Supplemental Figure 1: Relative deposition of zirconia against particle diameter for the four exposure scenarios as calculated by MPPD. Note that the exposure dose has no influence on the relative distribution in MPPD v2.11. (A) Consumer, upright; (B) consumer, leaning forward; (C) bystander, child; (D) infant, lying. Total deposition (green), head (black), conducting airways (blue), alveolar region (red).

A**B****C****D**

Supplemental Figure 2: Relative deposition of silica against particle diameter for the four exposure scenarios as calculated by MPPD. Note that the exposure dose has no influence on the relative distribution in MPPD v2.11. (A) Consumer, upright; (B) consumer, leaning forward; (C) bystander, child; (D) infant, lying. Total deposition (green), head (black), conducting airways (blue), alveolar region (red).