

# Supplementary Materials:

## Emitted dose data

**Table S1.** Variations in emitted dose (%) (avg  $\pm$  SD) with changes in gas flow rate (LPM), interface and nasal cannula size for adult devices,  $p < 0.05$  indicates significance.

Gas Flow (LPM)	OPT942	OPT944	OPT946	P-value	OPT970
10	37.78 $\pm$ 2.83	39.45 $\pm$ 3.08	50.87 $\pm$ 2.74	0.000	9.38 $\pm$ 0.37
30	25.68 $\pm$ 1.66	36.98 $\pm$ 2.85	35.74 $\pm$ 3.88	0.000	7.51 $\pm$ 0.72
50	9.96 $\pm$ 1.59	Not tested	Not tested	-	2.21 $\pm$ 0.31
60	Not tested	11.81 $\pm$ 1.36	11.83 $\pm$ 1.55	0.984	Not tested
P-value	0.000	0.000	0.000	-	0.000

**Table S2.** Variations in emitted dose (%) (avg  $\pm$  SD) with changes in gas flow rate (LPM) and nasal cannula size for paediatric and infant devices,  $p < 0.05$  indicates significance.

Gas Flow (LPM)	OPT316	OPT416	P-value	OPT318	OPT418	P-value
2	30.24 $\pm$ 1.37	31.64 $\pm$ 1.67	0.006	30.89 $\pm$ 1.27	31.65 $\pm$ 1.88	0.119
11	24.87 $\pm$ 0.65	25.16 $\pm$ 0.83	0.081	Not tested	Not tested	-
13	Not tested	Not tested	-	25.71 $\pm$ 0.92	25.46 $\pm$ 0.78	0.720
20	25.71 $\pm$ 0.50	25.46 $\pm$ 1.23	0.458	Not tested	Not tested	-
25	Not tested	Not tested	-	24.04 $\pm$ 1.10	24.68 $\pm$ 1.04	0.000
P-value	0.000	0.000		0.000	0.000	

## Tracheal dose data

**Table S3.** Variations in tracheal dose (%) (avg  $\pm$  SD) with changes in gas flow rate (LPM), interface and nasal cannula size for adult devices,  $p < 0.05$  indicates significance.

Gas Flow (LPM)	OPT942	OPT944	OPT946	P-value	OPT970
10	18.75 $\pm$ 0.83	19.32 $\pm$ 0.97	21.78 $\pm$ 0.66	0.000	4.75 $\pm$ 0.53
30	14.43 $\pm$ 0.41	5.89 $\pm$ 0.33	14.28 $\pm$ 0.49	0.000	2.84 $\pm$ 0.40
50	5.22 $\pm$ 0.20	Not tested	Not tested	-	0.40 $\pm$ 0.08
60	Not tested	1.77 $\pm$ 0.26	1.68 $\pm$ 0.27	0.139	Not tested
P-value	0.000	0.000	0.000	-	0.000

**Table S4.** Variations in tracheal dose (%) (avg  $\pm$  SD) with changes in gas flow rate (LPM) and nasal cannula size for paediatric and infant devices,  $p < 0.05$  indicates significance.

Gas Flow (LPM)	OPT316	OPT416	P-value	OPT318	OPT418	P-value
2	8.10 $\pm$ 0.85	8.14 $\pm$ 0.74	0.581	8.14 $\pm$ 0.74	9.78 $\pm$ 0.46	0.000
11	3.88 $\pm$ 0.36	3.81 $\pm$ 0.29	0.206	Not tested	Not tested	-
13	Not tested	Not tested	-	4.88 $\pm$ 0.45	4.94 $\pm$ 0.26	0.522
20	4.45 $\pm$ 0.16	4.46 $\pm$ 0.18	0.713	Not tested	Not tested	-
25	Not tested	Not tested	-	1.93 $\pm$ 0.35	1.89 $\pm$ 0.33	0.449
<b>P-value</b>	0.000	0.000		0.000	0.000	

#### GSD data

**Table S5.** Variations in geometric standard deviation (GSD) ( $\mu\text{m}$ ) (avg  $\pm$  SD) with changes in gas flow rate (LPM), interface and nasal cannula size for adult devices,  $p < 0.05$  indicates significance.

Gas Flow (LPM)	OPT942	OPT944	OPT946	P-value	OPT970
10	1.61 $\pm$ 0.04	1.68 $\pm$ 0.07	1.69 $\pm$ 0.06	0.015	1.93 $\pm$ 0.10
30	1.64 $\pm$ 0.05	1.90 $\pm$ 0.12	1.81 $\pm$ 0.08	0.003	2.50 $\pm$ 0.76
50	1.70 $\pm$ 0.14	Not tested	Not tested	-	2.12 $\pm$ 0.38
60	Not tested	1.78 $\pm$ 0.06	1.93 $\pm$ 0.08	0.003	Not tested
<b>P-value</b>	0.106	0.009	0.003		0.406

**Table S6.** Variations in geometric standard deviation (GSD) ( $\mu\text{m}$ ) (avg  $\pm$  SD) with changes in gas flow rate (LPM) and nasal cannula size for paediatric and infant devices,  $p < 0.05$  indicates significance.

Gas Flow (LPM)	OPT316	OPT416	P-value	OPT318	OPT418	P-value
2	1.64 $\pm$ 0.07	1.68 $\pm$ 0.11	0.335	1.72 $\pm$ 0.09	1.68 $\pm$ 0.13	0.542
11	1.77 $\pm$ 0.19	1.71 $\pm$ 0.09	0.366	Not tested		-
13	Not tested		-	1.62 $\pm$ 0.05	1.62 $\pm$ 0.06	0.920
20	1.76 $\pm$ 0.16	1.62 $\pm$ 0.09	0.048	Not tested		-
25	Not tested		-	1.61 $\pm$ 0.08	1.86 $\pm$ 0.10	0.002
<b>P-value</b>	0.139	0.110		0.012	0.000	