

Supplementary material: Tables S1 – S7

Table S1. Detected Ag contents (μg) in aerosols with various sizes (modified from Hsu¹)

Spray product	DI		DO _s		DO _t	
	Ag content (μg)	Percentage of Ag in aerosols (%)	Ag content (μg)	Percentage of Ag in aerosols (%)	Ag content (μg)	Percentage of Ag in aerosols (%)
2.5–10 μm	3.14	12.09	1.16	1.65	1.39	3.01
1–2.5 μm	1.76	3.70	0.99	0.23	2.76	0.17
< 1 μm	2.70	3.03	1.19	0.17	3.36	.015
Total	7.60		3.33		7.51	

Table S2. Results of Energy Dispersive X-ray (EDX) analyses of the representative TEM images of AgNPs-containing aerosols from the three spray products (modified from Hsu¹)

Spray DI		Spray DO _s		Spray DO _I	
Element	Weight (%)	Element	Weight (%)	Element	Weight (%)
C	8.80	C	45.62	Fe	15.88
Cu	12.85	O	22.60	Cu	84.25
Ag	78.35	Si	22.43	Totals	100.00
Totals	100.00	Cu	9.28		
		Ag	0.07		
		Totals	100.00		

Table S3. Fitted coefficients (mean \pm SE) of the three-parameter Hill model describing increase of neutrophils posed by human lung burdens of 34 or 60 nm AgNPs

Fitted coefficient	Particle size	
	34 nm	60 nm
E_{\max}	489.23 \pm 96.92***	252.97 \pm 113.39*
EC_{50} (mg)	8.73 \pm 2.45**	16.88 \pm 8.23
EC_{10} (mg)	3.98(2.10 – 7.65) ^a	9.89(4.98 – 13.27)
EC_5 (mg)	3.05(1.53 – 7.12)	8.25(4.02 – 12.69)
EC_1 (mg)	1.69(0.77 – 6.70)	5.52(2.51 – 12.73)
n	2.80 \pm 1.53	4.11 \pm 6.62
r^2	0.79	0.92
p value	***	***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

^a Mean (95% CI).

Table S4. Fitted coefficients (mean \pm SE) of the Weibull model to data points adopted from the CDFs of doses causing 1, 5, and 10% maximum increments of neutrophils in BALF ($EC1$, $EC5$, and $EC10$)

Particle size	Coefficients	Doses causing increments of neutrophils in BALF		
		$EC1$	$EC5$	$EC10$
34 nm	α	$2.54 \pm 0.25^{***}$	$3.02 \pm 0.32^{***}$	$3.31 \pm 0.33^{***}$
	β	$1.79 \pm 0.24^{***}$	$2.17 \pm 0.30^{***}$	$2.38 \pm 0.31^{***}$
	γ (mg)	0.32 ± 0.22	$0.84 \pm 0.30^*$	$1.26 \pm 0.30^{**}$
	r^2	0.99^{***}	0.99^{***}	0.99^{***}
60 nm	α	$5.63 \pm 0.69^{***}$	$6.24 \pm 1.02^{***}$	$5.78 \pm 0.70^{***}$
	β	$2.23 \pm 0.35^{***}$	$2.70 \pm 0.54^{**}$	$2.70 \pm 0.40^{***}$
	γ (mg)	1.08 ± 0.64	1.95 ± 0.98	$3.23 \pm 0.67^{**}$
	r^2	0.99^{***}	0.99^{***}	0.99^{***}

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table S5. Estimated threshold exposure duration after 2-yr exposure of spray DO_s or DO_L

Threshold exposure duration (h day ⁻¹)	Spray DO _s			Spray DO _L		
	γ_1 (34 nm) ^a	γ_5 (34 nm) ^b	γ_{10} (34 nm) ^c	γ_1 (60 nm) ^d	γ_5 (60 nm) ^e	γ_{10} (60 nm) ^f
	2.29	6.75	10.65	5.91	11.19	20.15
	(0.83–6.36) ^g	(3.43–13.46)	(6.36–18.09)	(2.21–15.67)	(4.65–26.63)	(11.51–35.39)

^a $\gamma_1 = 0.32 \pm 0.22$ mg. ^b $\gamma_5 = 0.84 \pm 0.30$ mg. ^c $\gamma_{10} = 1.26 \pm 0.30$ mg. ^d $\gamma_1 = 1.08 \pm 0.64$ mg. ^e $\gamma_5 = 1.95 \pm 0.98$ mg. ^f $\gamma_{10} = 3.23 \pm 0.67$ mg.

^gMedian (95% CI).

Abbreviations: γ_i , estimated threshold for $i\%$ adverse effect, DO_s, deodorant of AgNPs in smaller scales; DO_L, deodorant of AgNPs in larger scales.

Table S6. Estimated hazard quotient (HQ) in the criteria of γ_1 -based threshold for elevation of neutrophils in BALF at 2.5, 25, 50, 75, and 97.5% probabilities when using sprays DO_S and DO_L in non-intensive or intensive application

Application	Products	Probabilities				
		2.5%	25%	50%	75%	97.5%
Non-intensive	Spray DO _S	0.02	0.03	0.08	0.23	0.28
	Spray DO _L	3.91×10^{-3}	4.67×10^{-3}	1.13×10^{-2}	2.77×10^{-2}	3.24×10^{-2}
Intensive	Spray DO _S	0.29	0.35	0.99	2.78	3.38
	Spray DO _L	0.14	0.16	0.39	0.96	1.12

Abbreviations: DO_S, deodorant of AgNPs in smaller scales; DO_L, deodorant of AgNPs in larger scales.

Table S7. Exceedance risk (ER) estimates for hazard quotient (*HQ*) when using spray DO_s or DO_L at 20, 50, and 80% probabilities in non-intensive or intensive application

Application	Spray product	Exceedance risk		
		20%	50%	80%
Non-intensive	DO _s	6.81×10 ⁻² (2.41×10 ⁻² –2.85×10 ⁻¹) ^a	6.80×10 ⁻² (2.41×10 ⁻² –2.84×10 ⁻¹)	6.78×10 ⁻² (2.40×10 ⁻² –2.83×10 ⁻¹)
	DO _L	9.74×10 ⁻³ (3.92×10 ⁻³ –3.24×10 ⁻²)	9.72×10 ⁻³ (3.92×10 ⁻³ –3.24×10 ⁻²)	9.70×10 ⁻³ (3.91×10 ⁻³ –3.24×10 ⁻²)
Intensive	DO _s	0.814 (0.29–3.40)	0.812 (0.29–3.39)	0.810 (0.29–3.38)
	DO _L	0.338 (0.14–1.13)	0.337 (0.14–1.12)	0.336 (0.14–1.12)

^a Median (95% CI).

Abbreviations: DO_s, deodorant of AgNPs in smaller scales; DO_L, deodorant of AgNPs in larger scales.

Reference

1. Hsu YR. Characterization of nanoparticles released from commercial nanosilver-containing spray products. MS Thesis. Hsinchu, Taiwan ROC: National Chiao Tung University; 2016.