

Table 1: General characteristics of study population

	Controls (n=16)	Exposed (n=20)	P value (Controls vs Exposed)
Gender [M/F]	9/7	19/1	0.01
Age, years	41.3±9.7	45.0±8.9	0.25
Height, cm	169.7±7.1	175.4±8.9	0.04
Weight, kg	72.4±13.8	82.0±12.4	0.04
BMI, kg/m ²	25.0±3.3	26.7±4.0	0.18
Smokers, n(%)	3(18.75)	8(40.0)	0.17
Ex-smokers, n(%)	3(18.75)	6(30.0)	0.44
Non-smokers, n(%)	10(62.50)	6(30.0)	0.05
Duration of employment (years)	22.4(10.9)	27.0(10.1)	0.20
History of asthma, n(%)	0	2(10)	0.19
Dyspnea, n(%)	0	1(5)	0.36
Cough, n(%)	0	2(10)	0.19
Sputum, n(%)	0	2(10)	0.19
FVC (% predicted)	100 [95-111]	95 [87-105]	0.20
FEV ₁ (% predicted)	107 [101-109]	99 [90-109]	0.18
FEV ₁ / FVC (% predicted)	104 [101-106]	106 [99-107]	0.91
FEF ₂₅₋₇₅ (% predicted)	119 [102-135]	120 [86-131]	0.40

BMI: body mass index; FVC: forced vital capacity; FEV₁: forced expiratory volume in 1 second. Data are shown as mean ± standard deviation or median [inter-quartile range]. Bold values represent significant results. P-values were obtained by Student t-test or Chi-2 test.

Table 2: Parameters of exposure to beryllium in controls and exposed subjects

	Controls (n=16)	Low Be content (Plant A + Plant B) (n=8)	High Be content (Plant C) (n=12)
Parameters of exposure to Be			
Total years	0	10.8 [3.5-17.2]	11.7 [3.7-15.3]
WBED, years	0	1.3[0.4-16.0]	4.1 [1.1-8.5]
CBEI, ng.m ⁻³ .years	0	3.4 [2.5-4.4]	165.7 [42.4-2115.5]
Current Be exposure index, ng.m ⁻³	0	2.4 [0.0-6.4]	26.2 [1.2-242.8]
Co-exposure indices			
Number of pneumotoxic species	0.0 [0.0-2.2]	4.0 [3.5-6.0]	3.0 [2.0-4.5]
CEI, years	0 [0.0-0.4]	3.7 [3.0-4.4]	1.8 [0.3-4.0]

Be: beryllium; WBED: weighted beryllium exposure duration; CBEI: cumulative beryllium exposure index; CEI: cumulative co-exposure index. Data are shown as median [inter-quartile range].

Table 3: Results of exhaled biomarkers for controls and exposed subjects

	Limit of quantification (LOQ)	Controls (n=16) m[IQR]	Low Be content (Plant A + Plant B) (n=8) m[IQR]	High Be content (Plant C) (n=12) m[IQR]	p-value (equal group mean)
NO _x (μM)	2.00	8.46 [5.77-12.78]	11.57 [7.82-12.00]	9.55 [8.18-14.09]	0.26
TNF-α (pg/ml)	0.09	0.82 [0.51-1.60]	0.79 [0.74-1.76]	1.11 [0.63-1.74]	0.68
F _e NO (ppb)	1.00	15.45 [7.15-21.80]	13.08 [12.67-34.49]	10.23 [8.73-12.81]	0.12

NO_x: total nitrogen oxides in EBC; TNF-α: tumor necrosis factor-alpha in EBC; F_eNO: fraction of exhaled nitric oxide. Biomarkers concentrations are shown as median [inter-quartile range]. P-values were obtained from multiple-comparison tests in one-way ANOVA models with log-transformed data.

Table 4: The relationships between beryllium exposure with the exhaled biomarkers. The log-transformed values are used for beryllium exposure indices and exhaled biomarkers

Exposure parameters		NO _x (μM)	TNF-α (pg.ml ⁻¹)	F _e NO (ppb)
Alloy Be content				
Low Be content/controls	β (SE)	0.310 (0.261)	0.062 (0.223)	0.596 (0.406)
	p-value	0.25	0.78	0.16
High Be content/control	β (SE)	-0.020 (0.203)	0.198 (0.171)	0.012 (0.222)
	p-value	0.92	0.26	0.96
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Total years, (years)	β (SE)	0.053 (0.065)	0.065 (0.055)	0.083 (0.082)
	p-value	0.42	0.250	0.32
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WBED, (years)	β (SE)	0.037 (0.073)	0.139 (0.063)	0.116 (0.123)
	p-value	0.62	0.035	0.35
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CBEI, (ng.m ⁻³ .years)	β (SE)	-0.011 (0.050)	0.091 (0.040)	0.016 (0.57)
	p-value	0.83	0.031	0.79
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Current Be index, (ng.m ⁻³)	β (SE)	0.022 (0.072)	0.082 (0.064)	-0.079 (0.088)
	p-value	0.76	0.21	0.38

NO_x: total nitrogen oxides (nitrite and nitrate) in exhaled breath condensate (EBC); TNF- α: tumor necrosis factor-alpha in EBC; F_eNO: fraction of exhaled nitric oxide; WBED: weighted beryllium exposure duration; CBEI: cumulative beryllium exposure index. Multiple linear regressions were adjusted for history of pulmonary disease (excepted for TNF-α), smoking status, age, gender and cumulative co-exposure index (CEI). β (SE): parameter estimate (standard error). Bold values represent significant results (p<0.05).