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INTRODUCTION

According to the International Agency for Research on Cancer (IARC) benzene, a compound found in gasoline, is a carcinogen (Group 1). The exposure of workers to benzene in their daily activities is called occupational exposure and includes activities ranging from the synthesis process to distribution activities. Exposure to vapors may occur through dermal and / or inhalation contact and the possibility of cancer development, and impacts on the need to increase the knowledge about genotoxic and immunotoxic effects related to benzene present in fuels.

OBJECTIVE

This study aimed to evaluate the frequency of micronuclei and of cells participating in immunovigilance in workers exposed to fuel to verify possible association with the development of cancer.

METHODOLOGY

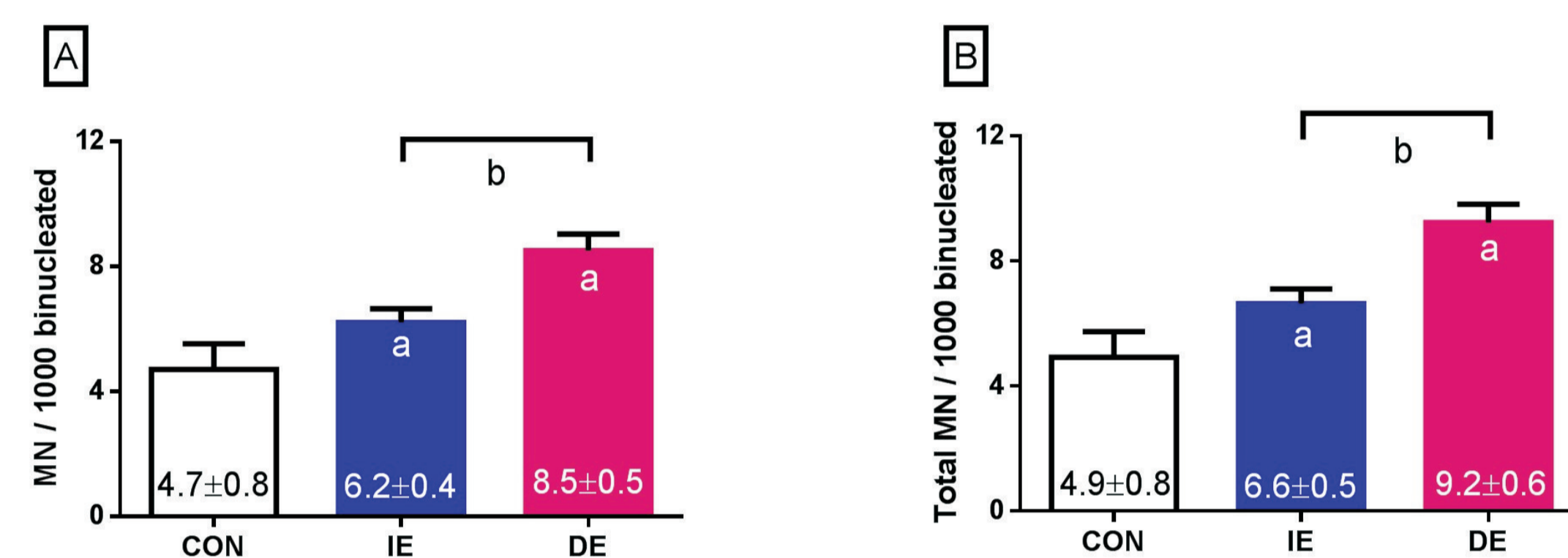
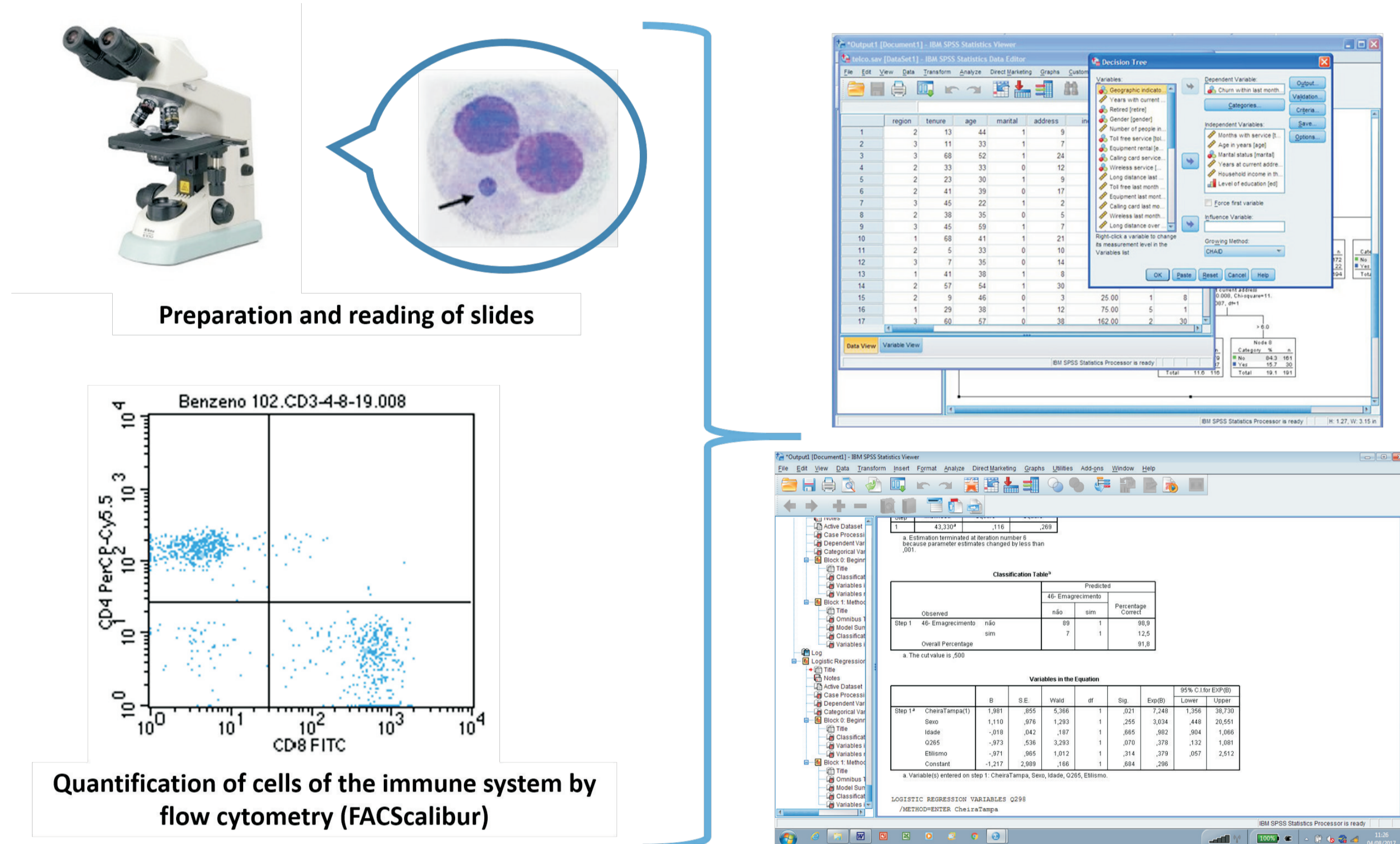


Figure 2: Frequency of micronuclei (A) and total frequency of micronuclei (B) in one thousand binucleated lymphocytes from workers of the three exposure groups. ^aMann Whitney, P <0.0001, compared to the control group; ^bMann Whitney, P <0.01, comparing the groups of direct and indirect exposure to fuels.

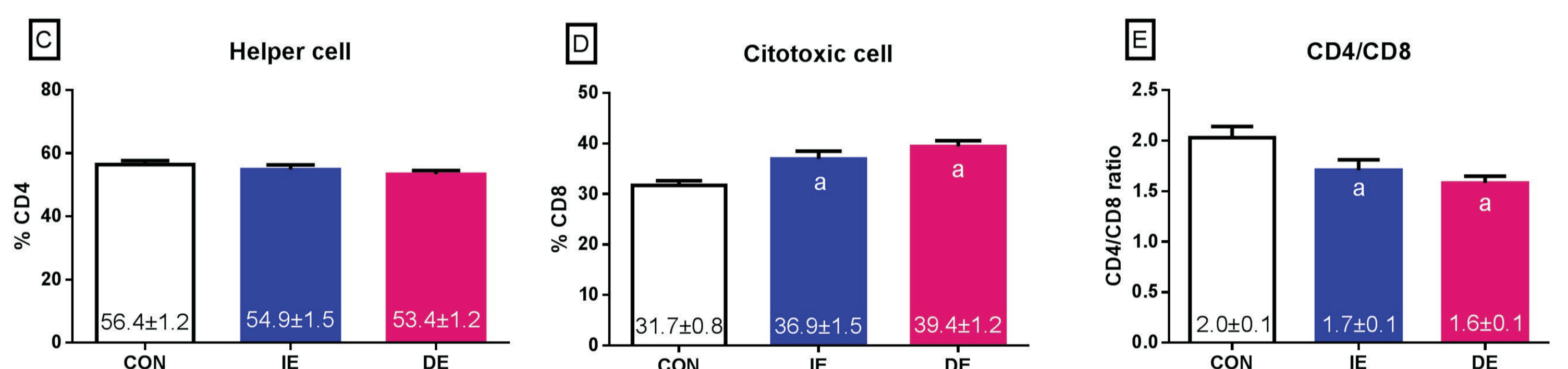
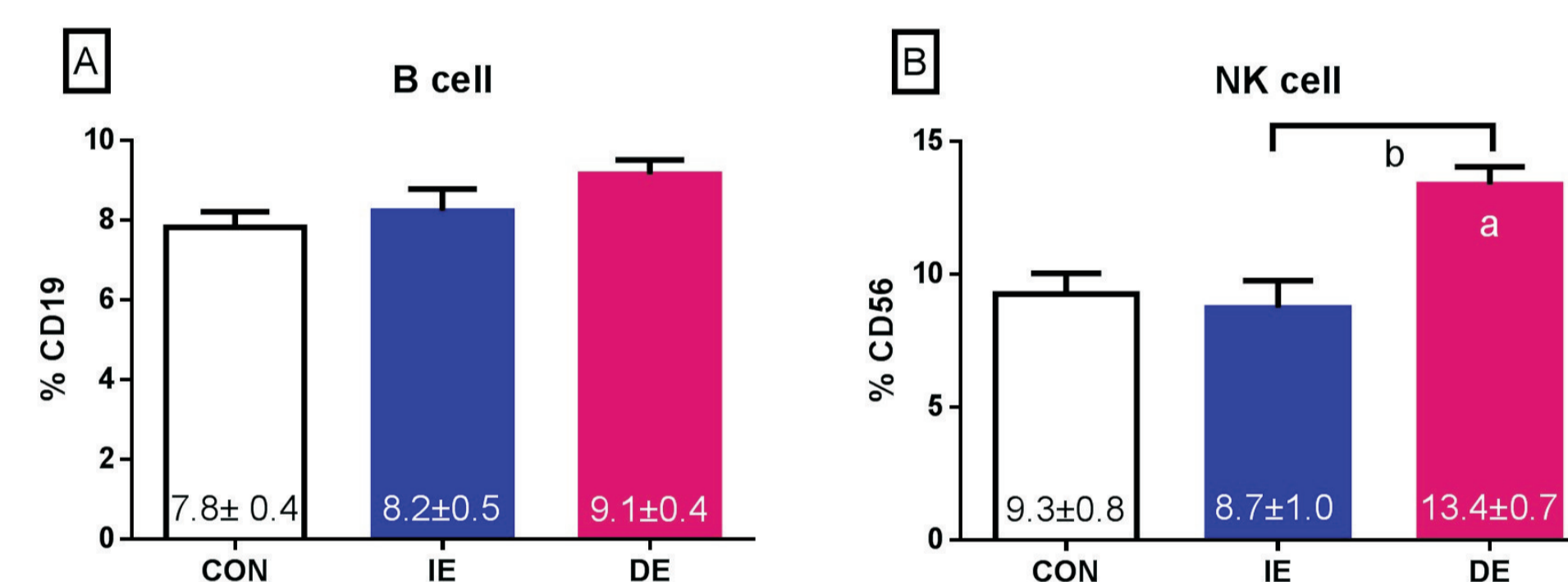


Figure 3: Percentage of B cells [A], NK [B], helper [C] and cytotoxic [D] and CD4 / CD8 ratio [E] present in worker's blood. ^aMann Whitney, P <0.05, compared to the control group; ^bMann Whitney, P <0.0001, comparing groups of direct and indirect exposure to fuels.

RESULTS

The study was attended by 350 volunteers: 150 workers exposed by inhalation and dermal to fuels (direct exposure, DE), 100 exposed by inhalation only (indirect exposure, IE) and 100 office workers (INCA and UNIRIO) not exposed to fuels (control group, CON).

Table 1: Descriptive analysis of workers exposed to fuels.

Demographic variables		DE - N (%)	P-value ¹
Sex	Male	32 (32.0)	<0.001
	Female	137 (91.3)	
Age	Median (min-max) ²	30 (20-67)	<0.001
	Not white ³	75 (75.0)	
Skin color	White	24 (24.0)	<0.001
	NA ⁴	01 (1.0)	
	Married	44 (44.0)	
Marital status	Single, separated	56 (56.0)	0.045
	NA ⁴	00 (0.0)	
Socioeconomic variables			
Education	Elementary School	25 (25.0)	<0.001
	High school	61 (61.0)	
	Higher education	14 (14.0)	
Life habits			
Smoking	Never smoked	78 (78.0)	0.262
	Ex smoker	15 (15.0)	
	Smoker	07 (7.0)	
Intake of alcoholic beverages	No	43 (43.0)	0.287
	Yes	57 (56.0)	
Occupational Variables			
Working time	1 to 10 years	88 (88.0)	0.011
	10 to 20 years	10 (10.0)	
	> 20 years	01 (1.0)	
	NA ⁴	01 (1.0)	

¹Chi-square test excluding the category NA; ²Min-max: upper and lower limits; ³Black, brown, yellow and indigenous; ⁴No answer / Do not know.

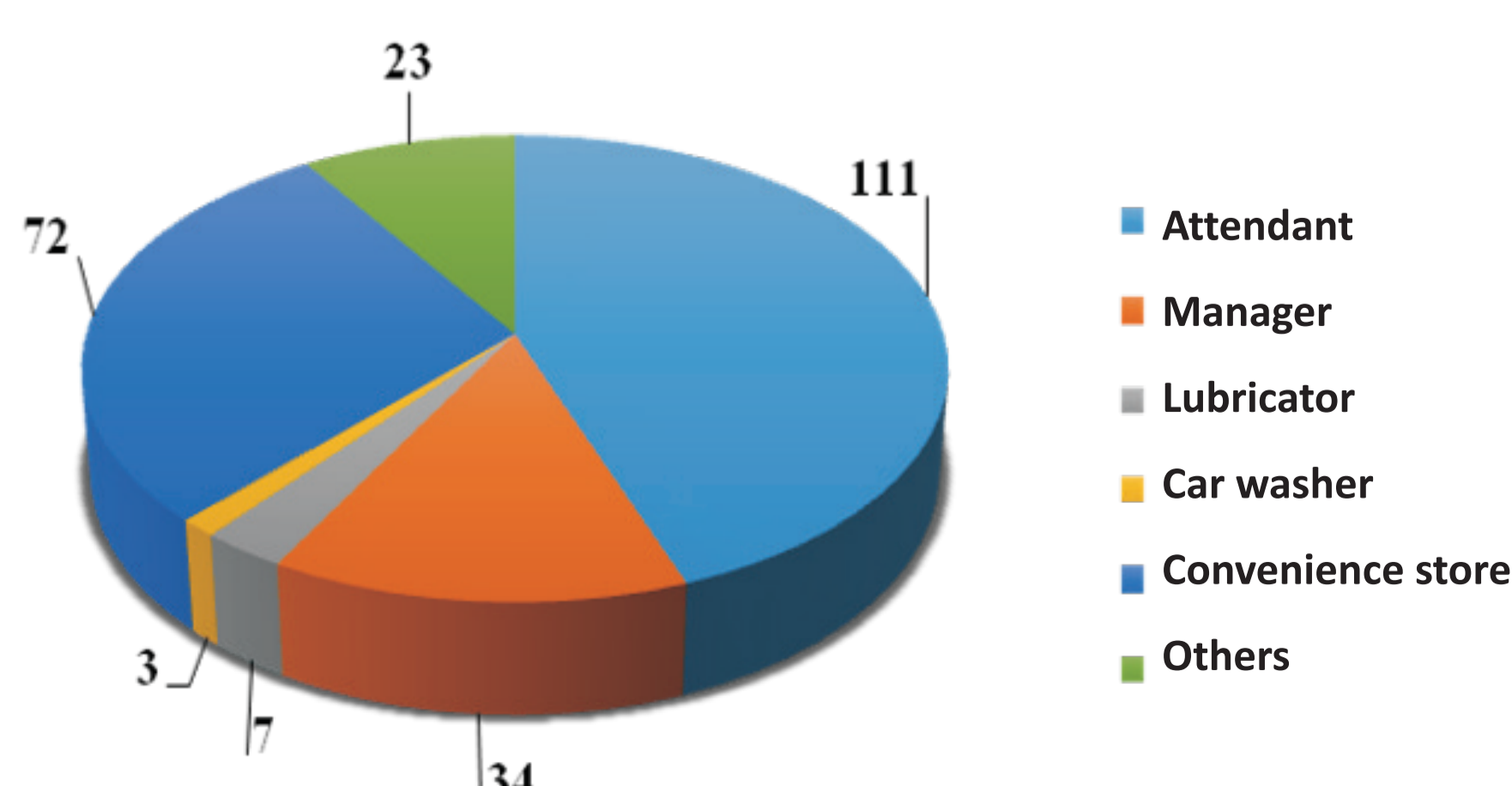


Figure 1: Distribution of the functions of exposed workers. Other: Security, office, cleaning, among others.

Table 2: Multivariate logistic regression analysis between exposure to fuels and genotoxic effects and immunotoxic adjusted by confounding factors.

Toxicological effect	p-value ³		Odds ratio	
	No	Yes	OR	IC95%
Micronucleus test (N = 265)¹				
Type of worker				
CON ⁸	64 (64.0)	36 (36.0)	1.0	1.0
IE	16 (25.5)	55 (77.5)	6.11	3.06 – 12.19
DE	12 (14.0)	74 (86.0)	10.96	5.26 – 22.84
Immunophenotyping - CD56 (N = 235)²				
Type of worker				
CON ⁸	46 (59.7)	31 (40.3)	1.0	1.0
IE	26 (47.3)	29 (52.7)	0.002	1.66 0.82 – 3.33
DE	30 (32.3)	63 (67.7)	3.12	1.66 – 5.85
Immunophenotyping - CD4/CD8 ratio (N = 235)²				
Type of worker				
CON ⁸	49 (62.0)	30 (38.0)	1.0	1.0
IE	46 (78.0)	13 (22.0)	0.058	60.4 0.22 – 0.99
DE	73 (76.0)	23 (24.0)	0.52	0.27 – 0.99

¹genotoxic effect (micronucleus) - No: <3.7 MN. Yes: > 3.7 MN; ²immunotoxic effect (Immunophenotyping) - No: ≤8,78 CD56 and No: > 8,78 CD56 and No: ≤2,03 CD4/CD8. Yes: > 2,03 CD4/CD8; ³Chi-square test; ⁴Micronuclei: OR adjusted for kidney disease, age, smoking and sex; Immunofenotipagem ⁵CD56: OR adjusted for consumption of processed foods, sex and age; ⁶CD4 / CD8 ratio: OR adjusted for sex and age. ⁸Reference Category.

Apoio Financeiro: PPSUS/Faperj; OPAS; INCA/MS

Projeto Gráfico: Setor de Edição e Informação Técnico-Científica / INCA