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# Air pollution and health: study of the biological effects in children by buccal micronucleus assay

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Evaluation of the association between air pollutant levels and the micronuclei frequency (MN) in children of 5 Italian towns considering also lifestyles and socio-demographic features.

**BIOLOGICAL SAMPLING**

**ENVIRONMENTAL EXPOSURE**

**QUESTIONNAIRES**



**Collection of buccal mucosa cells of children**



**MN frequency**



**Collection of PM<sub>0.5</sub>**  
↓  
**Chemical analysis**  
**Genotoxicological test**



**Gathering of air quality data from Regional Agency for Environmental Protection during all study period**



**Collection of information about indoor and outdoor exposure, area of residence, respiratory diseases and drug consumption, BMI, diet, physical activity and other aspects of children lifestyle**

**Two sampling periods**  
**WINTER 2014-2015**  
**LATE SPRING 2015**

# Results: MN test in buccal cells of children

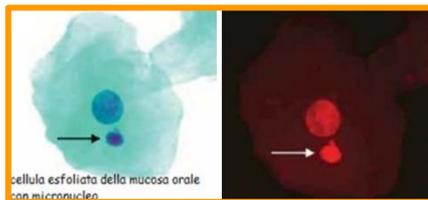
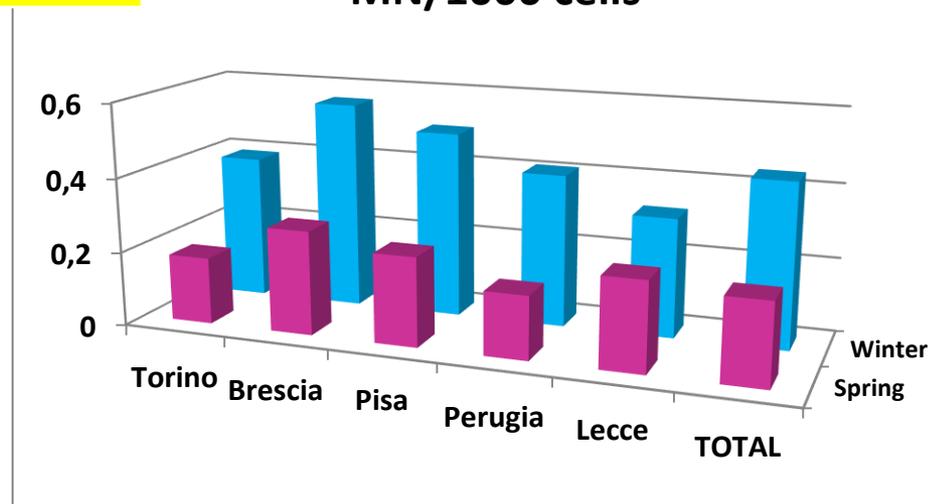


1093 subjects in winter  
1046 subjects in spring



City	1 <sup>st</sup> season		2 <sup>nd</sup> season	
	Mean ± SD (‰)	≥1 MN (%)	Mean ± SD (‰)	≥1 MN (%)
<i>Lecce</i>	0.32 ± 0.44	45.1	0.24 ± 0.32	41.3
<i>Perugia</i>	0.41 ± 0.59	48.7	0.17 ± 0.28	31.4
<i>Pisa</i>	0.50 ± 0.65	56.6	0.24 ± 0.37	34.0
<i>Brescia</i>	0.56 ± 0.62	60.7	0.28 ± 0.42	40.1
<i>Torino</i>	0.39 ± 0.48	51.9	0.18 ± 0.29	31.8
<b>TOTAL</b>	<b>0.44 ± 0.57</b>	<b>52.7</b>	<b>0.22 ± 0.34</b>	<b>35.9</b>

MN/1000 cells



Micronucleus cytome assay

# Results: statistical analysis of associations

- **Season:** MN frequency is higher in winter than in spring
- **Town of residence:** children living in Brescia and Pisa have higher MN frequency than those living in Perugia, Turin and Lecce
- **Levels of benzene, PM<sub>2.5</sub>, ozone, SO<sub>2</sub> in air and PAH in PM<sub>0.5</sub>:** higher levels are moderately associated with higher MN frequency. The increase of the risk of having MN for one unit increase of air pollutant levels was:
  - 20.1% for benzene (1 µg/m<sup>3</sup>)
  - 1.1% for PM<sub>2.5</sub> (1 µg/m<sup>3</sup>)
  - 1.3% for ozone (1 µg/m<sup>3</sup>)
  - 4.2% for SO<sub>2</sub> (1 µg/m<sup>3</sup>)
  - 1.7% for PAHs (1 ng/m<sup>3</sup>).
- **Children's characteristics:** environmental tobacco smoke and high BMI are positively associated with MN frequency, while adherence to Mediterranean diet is negatively associated.

MN frequency investigated in this study was moderately associated with the levels of some air pollutants and with other factors, and it might be predictive of the occurrence of future harmful effects in humans. But these findings may be observed at a population level, and cannot be considered predictive of the development of chronic diseases in a single individual.

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