

L'inquinamento indoor da particolato

Giovanni Invernizzi, Ario Ruprecht, Cinzia De Marco

Laboratorio per la Ricerca Ambientale-SIMG

*Laboratorio per la Ricerca sullInquinamento da Fumo di Tabacco-Istituto Nazionale dei
Tumori/SIMG*

Milano

ginverni@clavis.it

Ambient air quality standards

Table 1. Levels of fine particulate (PM_{2.5}) air pollution and corresponding federal health advisory descriptors with accompanying simplified color code (US EPA, 1999).

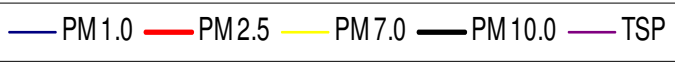
| PM _{2.5} (µg/m ³) AQI Break-points | Air Quality Index | Category | Color Code |
|---|-------------------|----------------------|------------|
| 0.0 - 15.4 | 0 - 50 | Good | Green |
| 15.5 - 40.4 | 51 - 100 | Moderate | Yellow |
| 40.5 - 65.4 | 101 - 150 | Unhealthy SG* | Orange |
| 65.5 - 150.4 | 151 - 200 | Unhealthy | Red |
| 150.5 - 250.4 | 201 - 300 | Very unhealthy | Violet |
| 250.5 - 350.4 | 301 - 400 | Hazardous | Maroon |
| 350.5 - 500.4 | 401 - 500 | Very Hazardous | Maroon |
| > 505 | 500 | (Significant Harm)** | |

*SG = sensitive groups; **exists, but is not a part of the AQI. Source U.S. EPA, 1999.

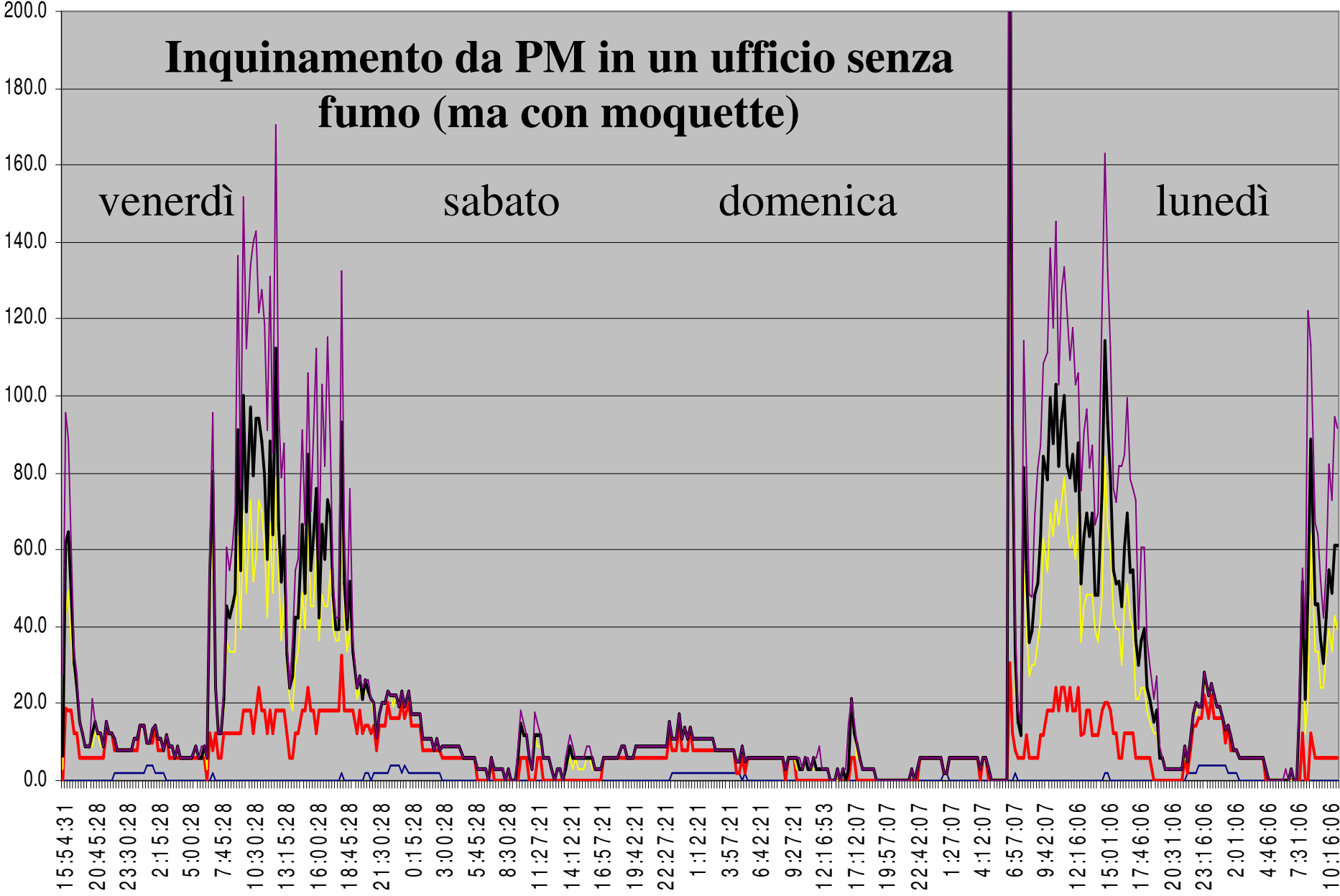
[GUIDELINE FOR REPORTING OF DAILY AIR QUALITY - AIR QUALITY INDEX (AQI) United States Office of Air Quality EPA-454/R-99-010 Environmental Protection Planning and Standards July 1999 Agency Research Triangle Park, NC 27711].





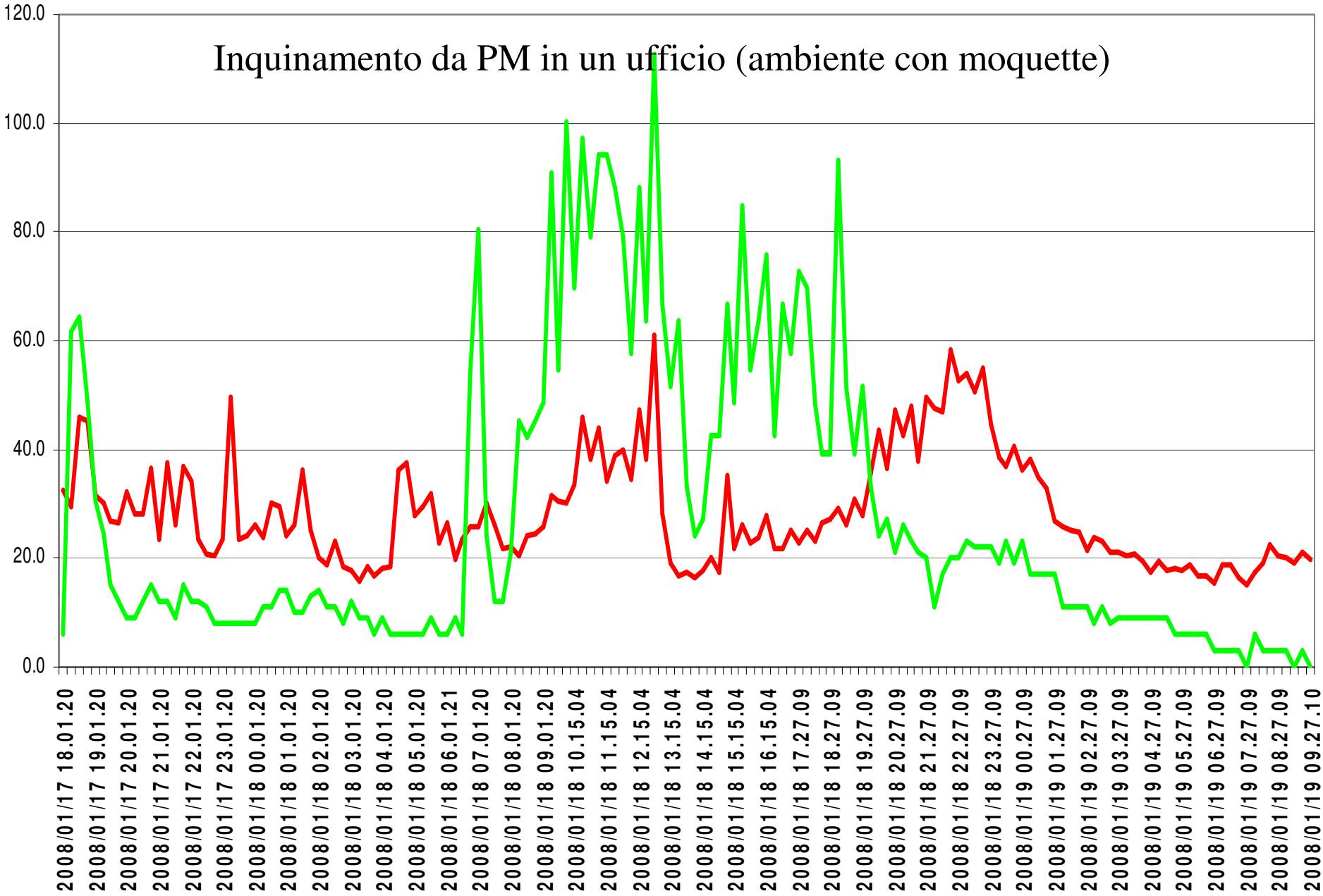


Inquinamento da PM in un ufficio senza fumo (ma con moquette)



PM10 outdoor PM10 indoor

Inquinamento da PM in un ufficio (ambiente con moquette)



Particolato risollevato durante le operazioni di pulizia in un ufficio con moquette

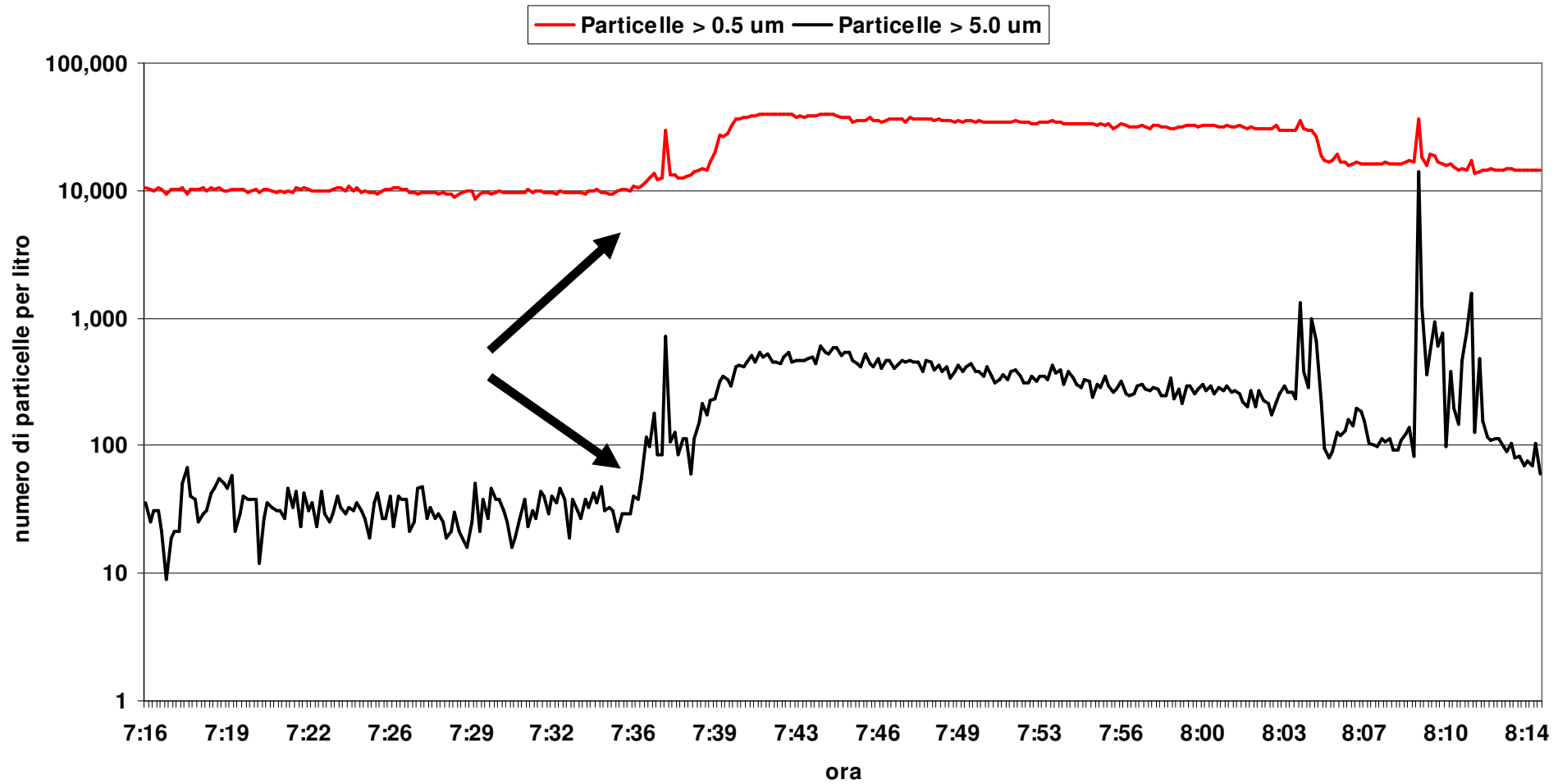
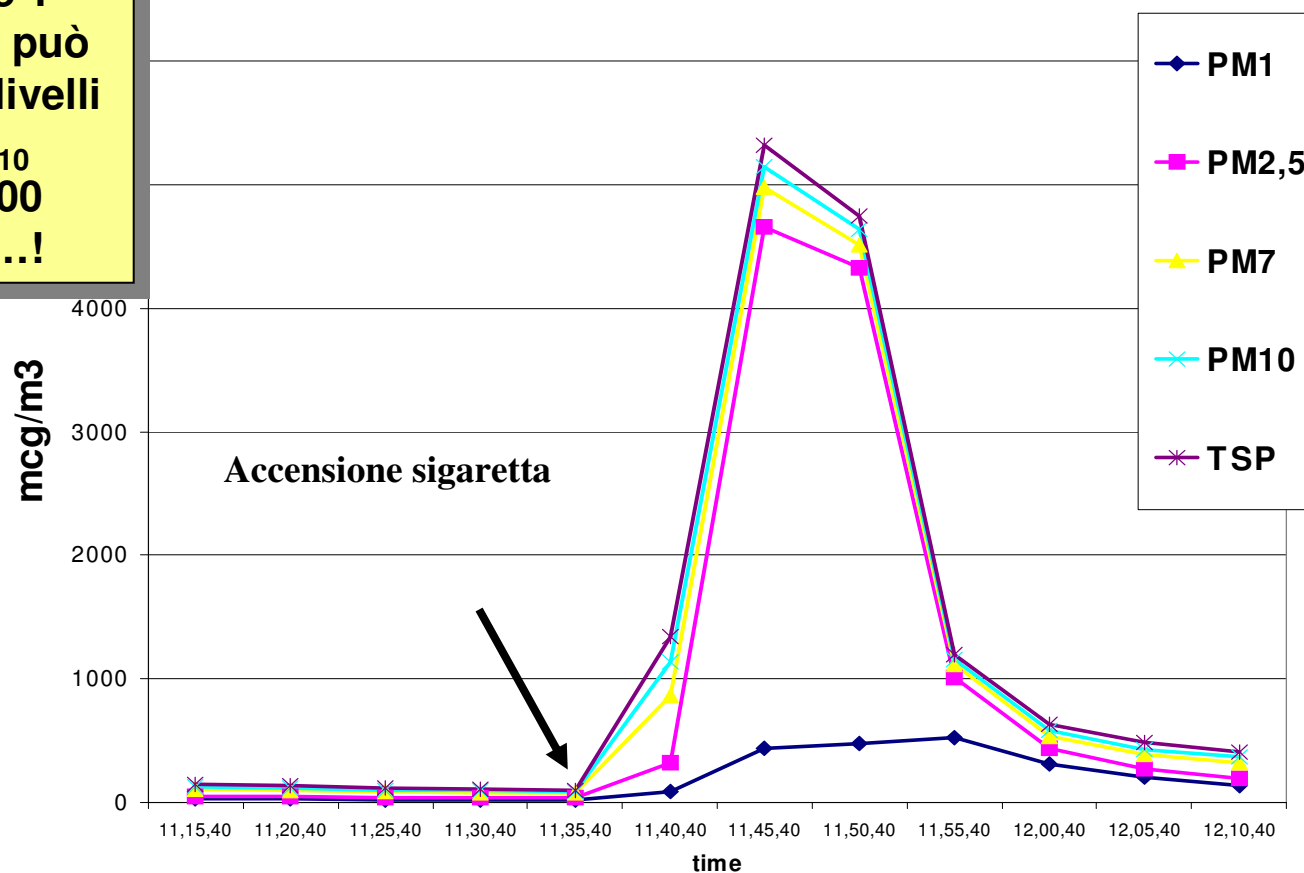
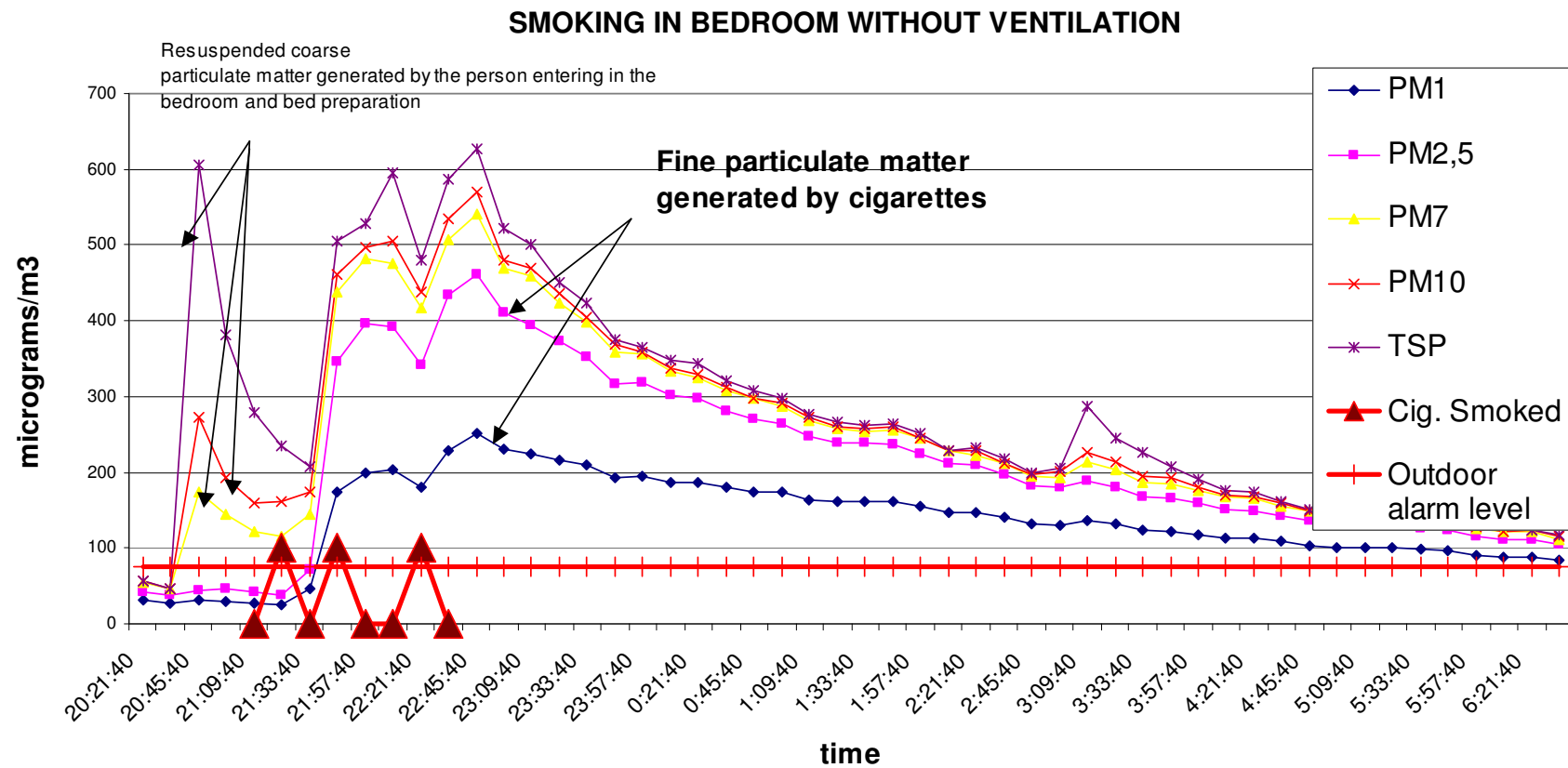


Figura 1. L'inquinamento indoor da polveri sottili prodotte dal fumo di tabacco in un ufficio con impianto di ventilazione in funzione

Fumare 1 sigaretta può portare i livelli di PM_{10} a...4.000 $\mu g/m^3$...!



Indoor vs outdoor: smoking in the bedroom.



Ambient air quality standards

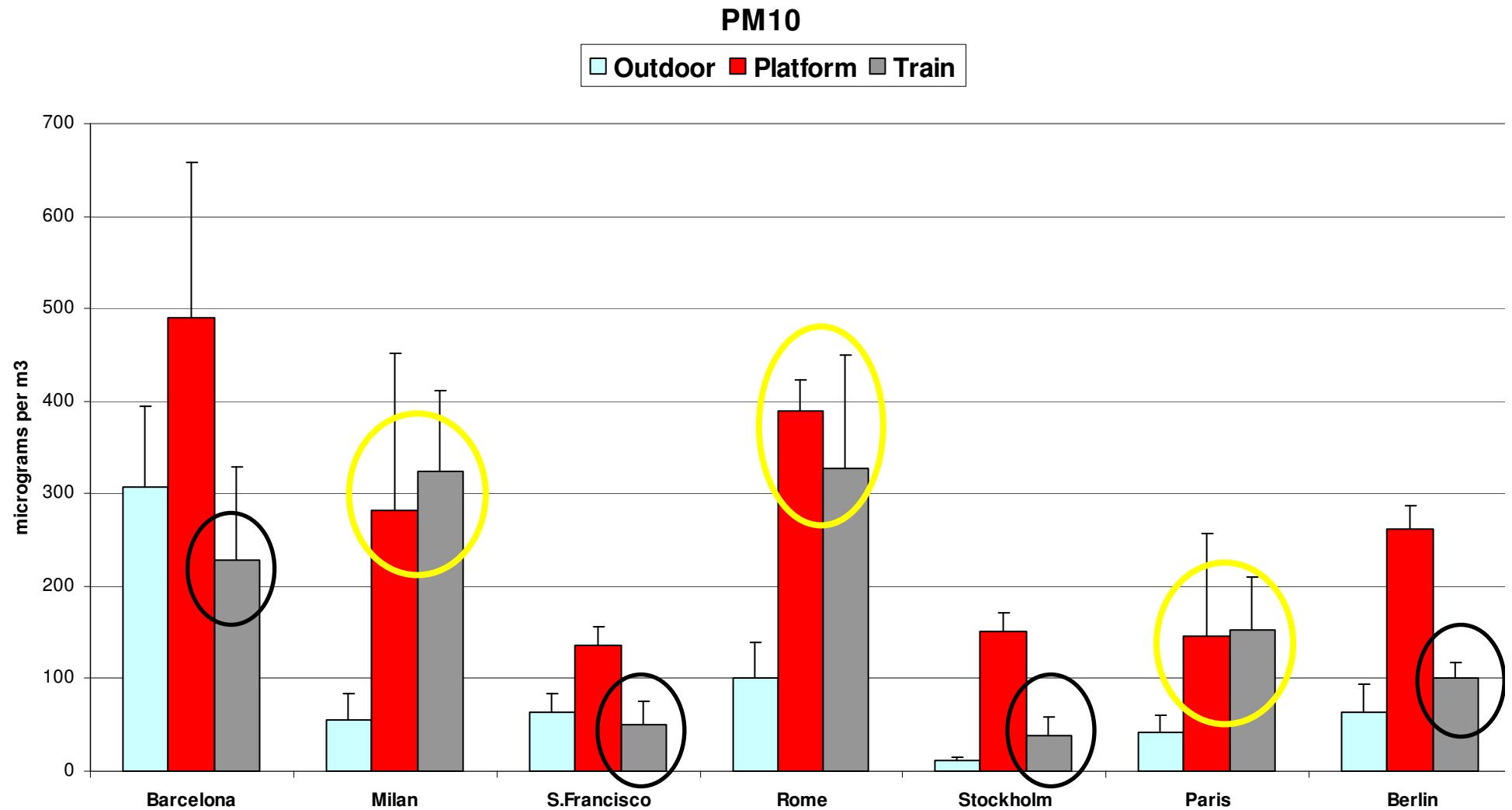
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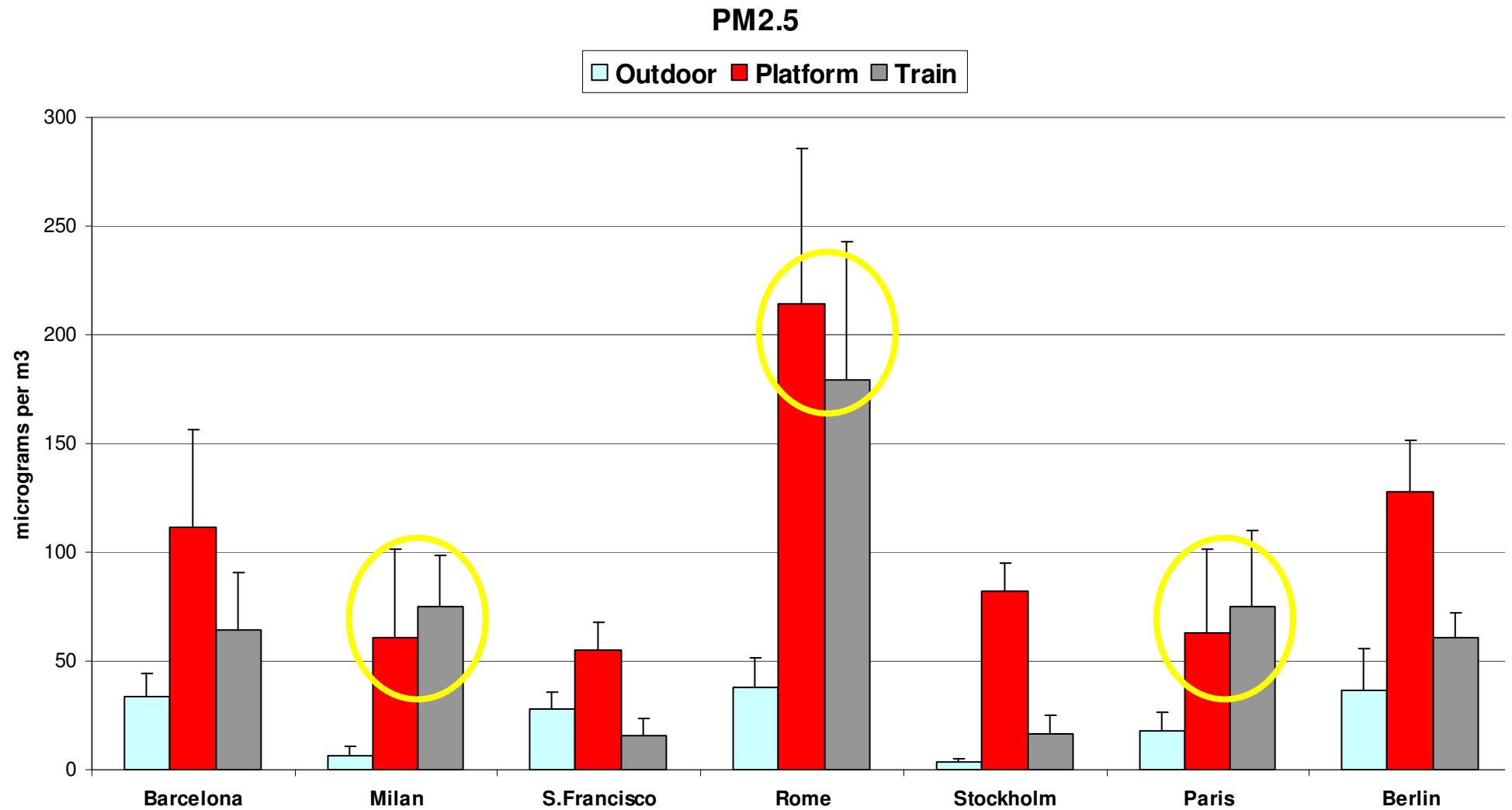
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Livelli di inquinamento da polveri sottili in metropolitana



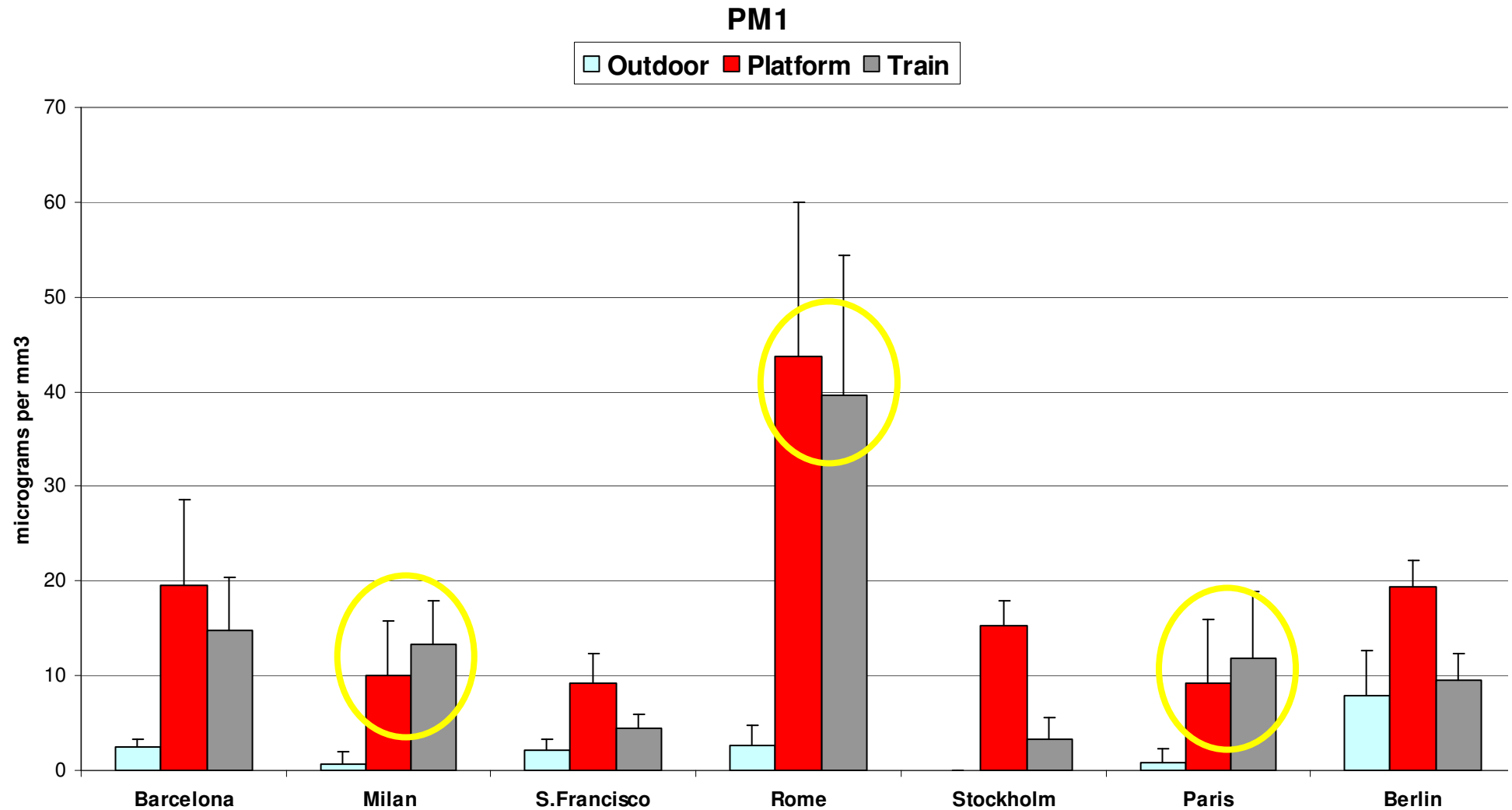
Invernizzi G, Ruprecht A, De Marco C, in preparation

Livelli di inquinamento da polveri sottili in metropolitana



Invernizzi G, Ruprecht A, De Marco C, in preparation

Livelli di inquinamento da polveri sottili in metropolitana



Invernizzi G, Ruprecht A, De Marco C, in preparation

Fumare una sigaretta sul balcone per non inquinare la propria abitazione: ma quanti minuti occorrono prima di rientrare in casa?

Una nuova forma di inquinamento indoor: il “Residual Tobacco Smoke”

RESEARCH PAPER

Residual tobacco smoke: measurement of its washout time in the lung and of its contribution to environmental tobacco smoke

Giovanni Invernizzi, Ario Ruprecht, Cinzia De Marco, Paolo Paredi, Roberto Boffi

Tobacco Control 2007;**16**:29–33.

Dopo l'ultima boccata i polmoni restano pieni di particelle inquinanti per almeno 2-3 minuti

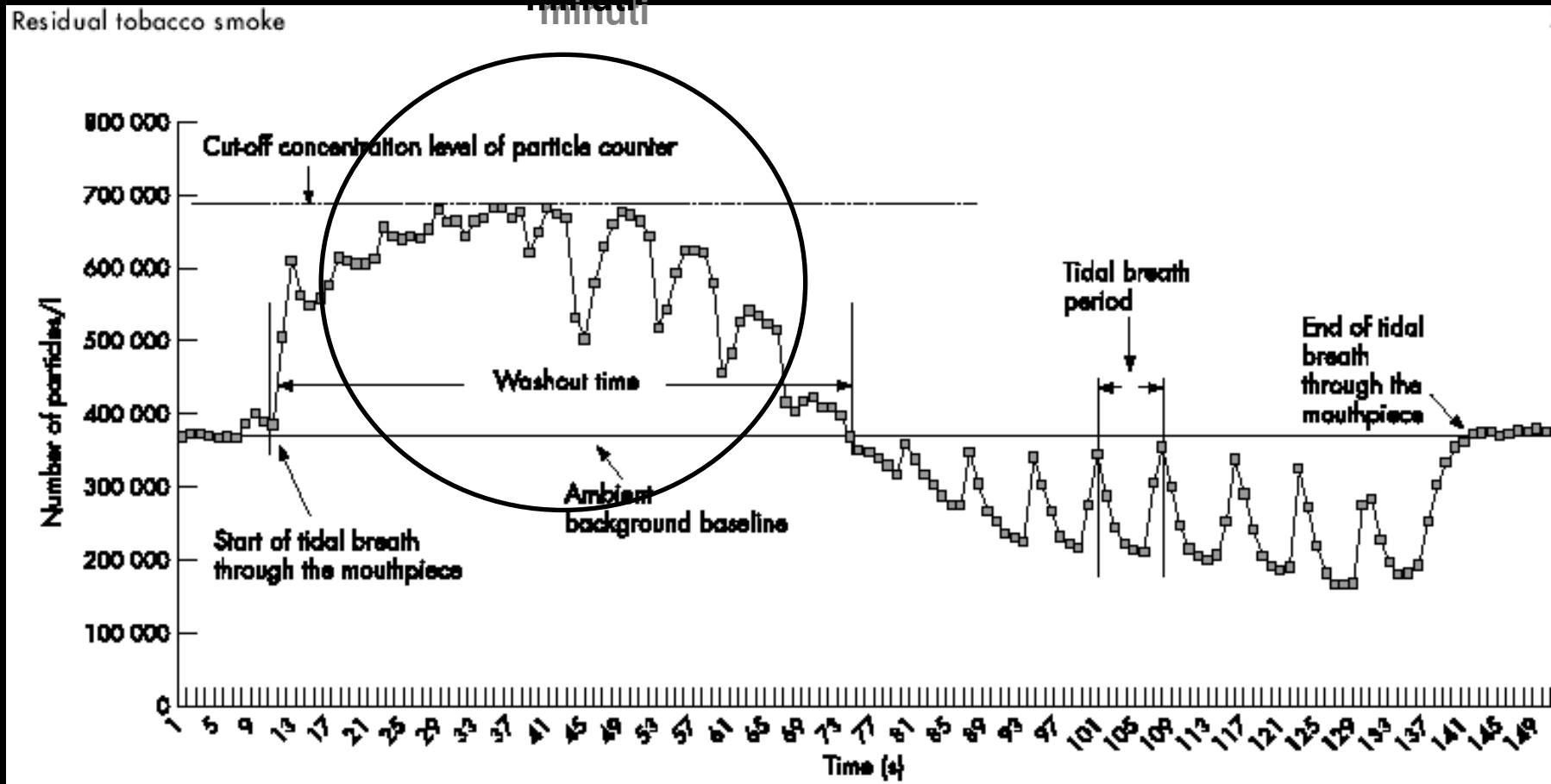


Figure 2 Washout time of 0.3–1.0 μm -sized particles in the exhaled breath after smoking the last puff, real-time measurements at tidal breathing.

Table 1 Mainstream smoke washout time in 10 consecutive smokers coming back into the laboratory after smoking outdoors

| Subject | Complete washout time from last puff (s) | Number of respiratory acts to complete washout |
|---------|--|--|
| 1 | 31 | 4 |
| 2 | 18 | 3 |
| 3 | 70 | 9 |
| 4 | 49 | 7 |
| 5 | 53 | 7 |
| 6 | 78 | 12 |
| 7 | 90 | 15 |
| 8 | 66 | 8 |
| 9 | 45 | 5 |
| 10 | 86 | 17 |
| Average | 58.6 | 8.7 |
| SD | 23.6 | 4.6 |

Contributo del residual tobacco smoke all'inquinamento da polveri indoor (5 rientri dopo aver fumato all'aperto)

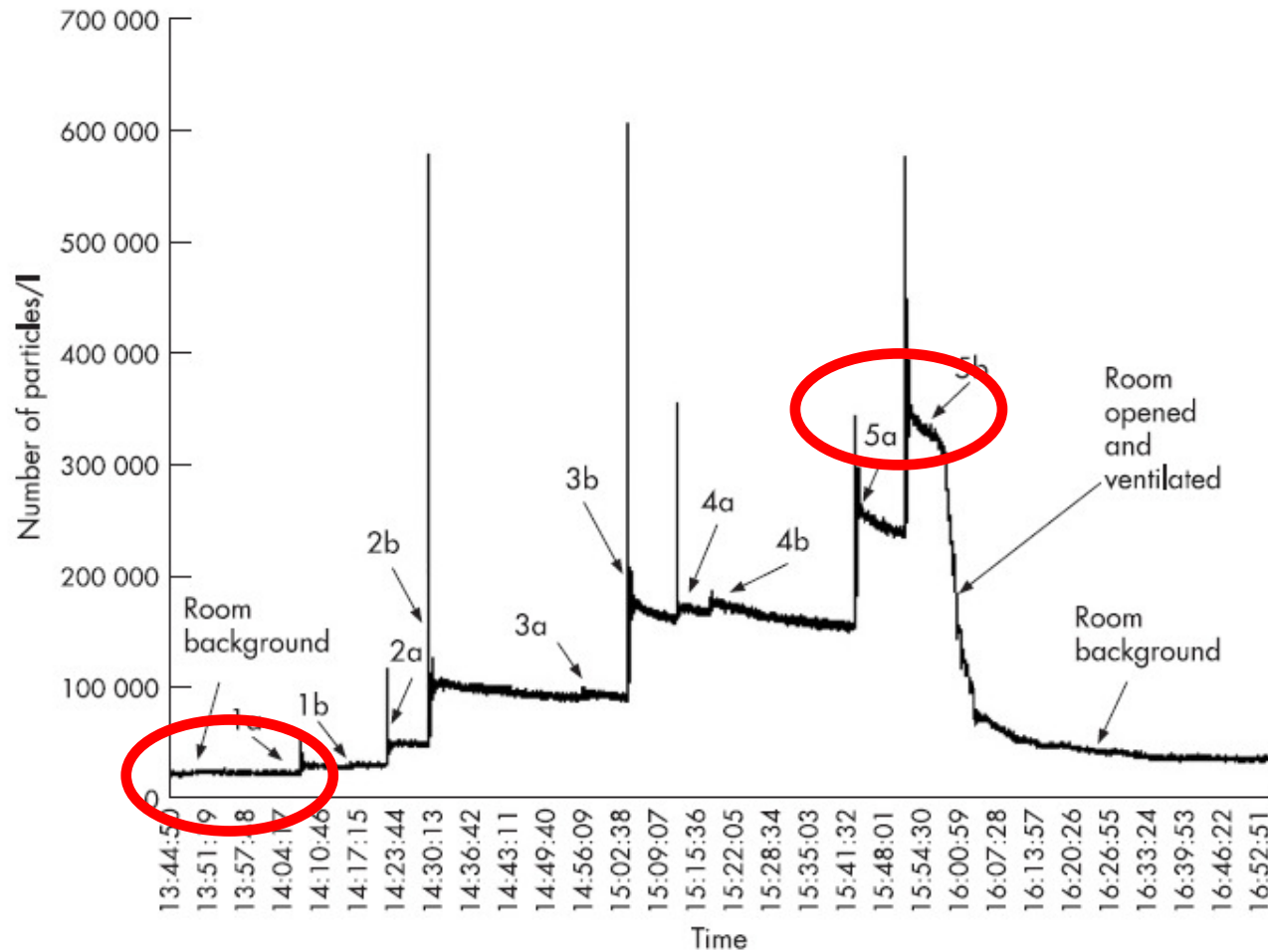


Figure 3 Increase of indoor 0.3–1.0 μm particle concentration due to RTS. Contribution from five different smokers (two tests each, a and b).

Fumo di tabacco e farmaci inalatori: l'interazione fra particelle sospese cambia il profilo aerodinamico degli spray e delle polveri, modificandone la deposizione regionale: una spiegazione del fenomeno clinico della "steroid resistance", la refrattarietà dei fumatori asmatici e BPCO alla terapia inalatoria.

Inhaled steroid/tobacco smoke particle interactions: a new light on steroid resistance.

Invernizzi G, Ruprecht A, De Marco C, Mazza R, Nicolini G, Boffi R.

Respiratory Research, 2009

L'interazione tra particelle sospese avviene in tempi velocissimi, dell'ordine dei millisecondi: ecco come le dimensioni degli spray cambiano in tempo reale.

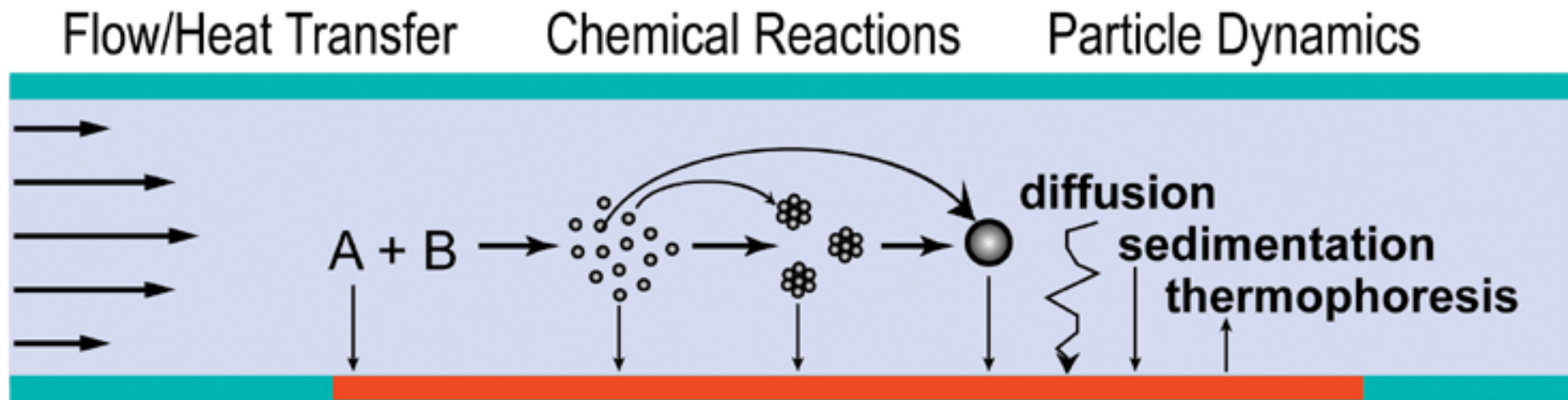
Conclusions. Our data suggest that particle interaction between inhaled BDP-HFA pMDI and ETS takes place in the first few seconds after drug delivery, with a decrease in smaller particles and a concurrent increase of larger particles.

The resulting changes in aerosol particle profile might modify regional drug deposition with potential detriment to drug efficacy, and represent a new element of steroid resistance in smokers.

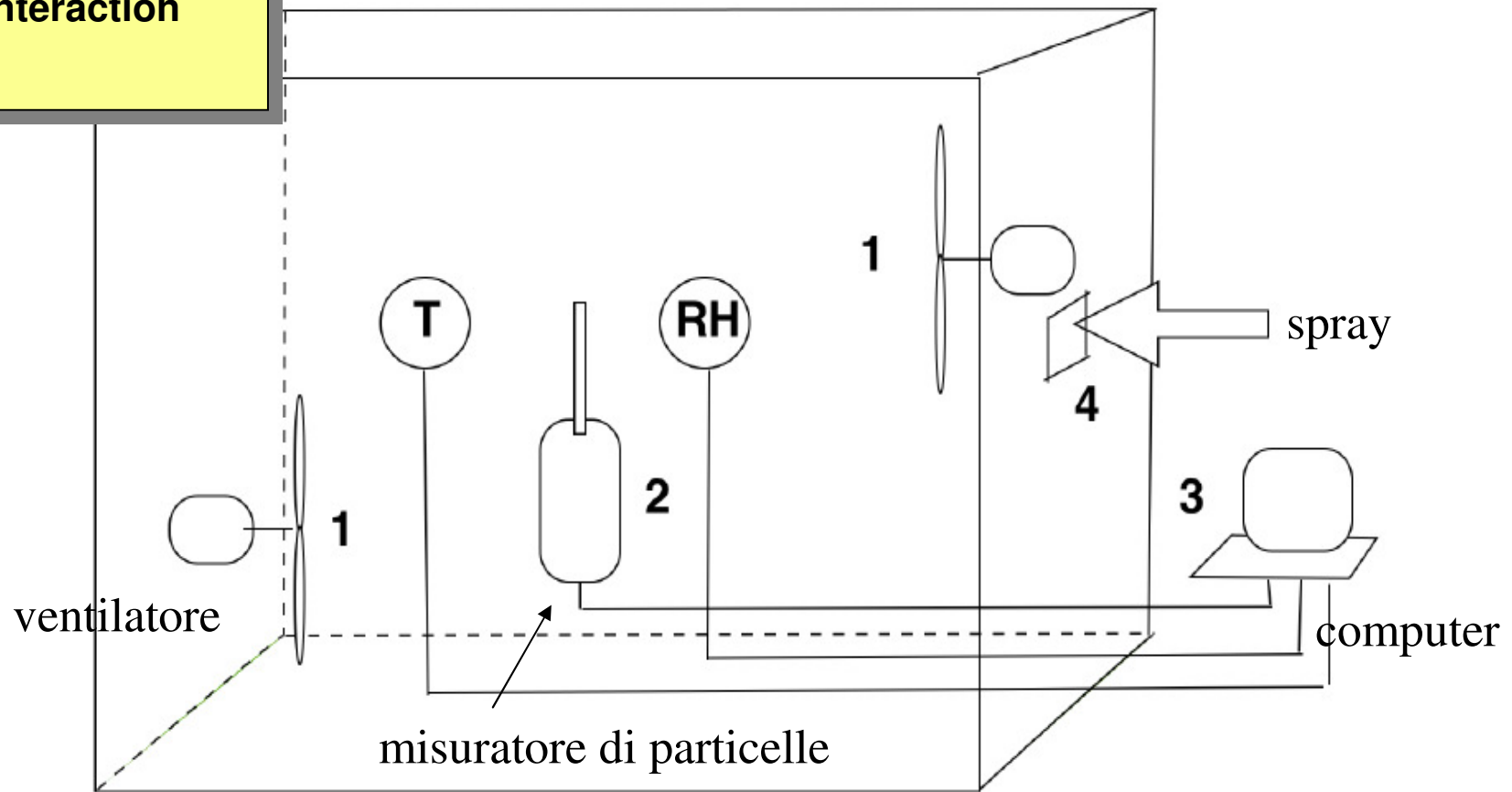
Although the present study does not provide any functional or clinical assessment, it might be useful to advise smokers and non smokers with obstructive lung disease such as asthma or COPD, to avoid to act inhaled drugs in the presence of ETS in order to obtain the best therapeutic effect.

Particle interaction.

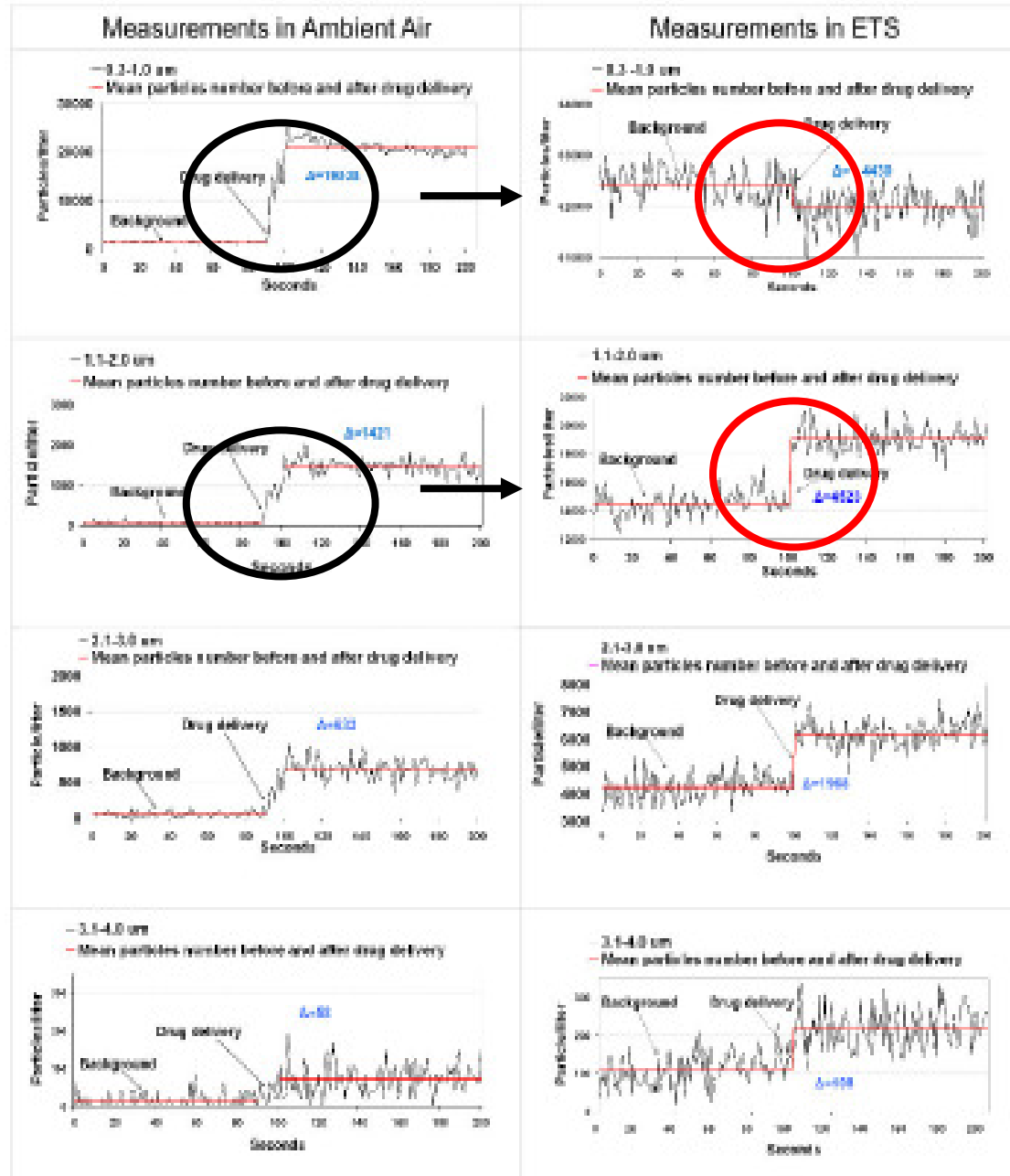
L'accrescimento delle dimensioni delle particelle sospese è un fenomeno (particle coagulation) conosciuto da molto tempo, che si manifesta in tempi brevissimi, dell'ordine dei millisecondi



**Il setting
sperimentale per
lo studio della
particle
interaction**

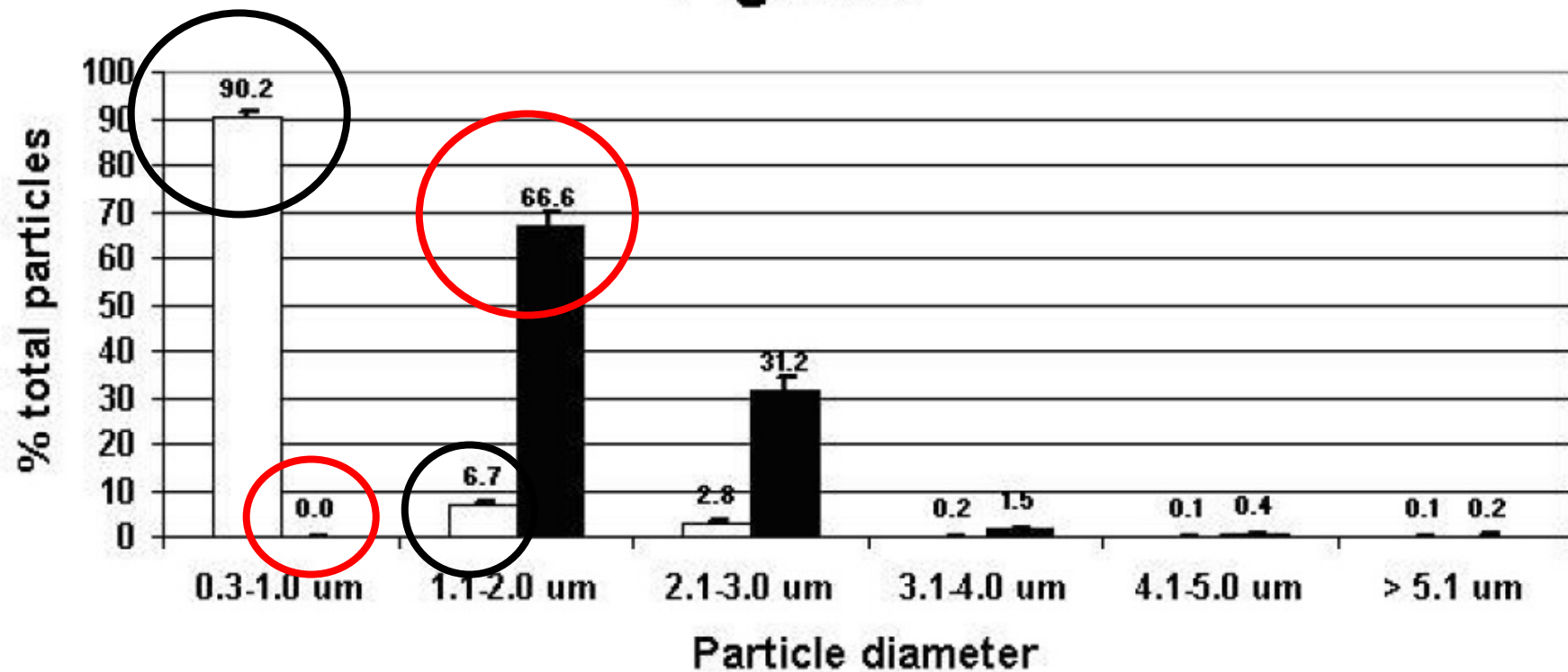


Erogate in aria pulita (colonna a sx), le particelle di farmaco di dimensioni comprese tra 0.3-1.0 μm assommano a circa 20.000/litro. Se invece vengono erogate in presenza di fumo di sigaretta (colonna a dx), non si evidenzia un aumento delle particelle submicrometriche, mentre aumentano quelle di dimensioni maggiori



Il grafico illustra il profilo aerodinamico delle particelle di beclometasone HFA: le differenze tra le erogazioni in aria pulita (colonne bianche) e in presenza di fumo (colonne nere) sono evidenti

Figure 3



Grazie per
l'attenzione!

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