



Reduction of indoor concentration of particles
WP 3.1

*Michal Spilak
 Marie Frederiksen
 Barbara Kolarik
 Karine R. Nielsen
 and Lars Gunnarsen*



Reduction of indoor concentration of particles
Introduction

- November 2010 – May 2011
- 27 dwellings (40 planned)
- The Greater Copenhagen area
- Highly trafficked roads
- Over 55 years
- Non-smokers
- No mechanical ventilation





Reduction of indoor concentration of particles
Introduction

- Four weeks-intervention
- Filtered / Non filtered period
- Two particle filtration units

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Bedroom and Living Room

- $PFU_{ACR} \gg ACR_{INF}$

Reduction of indoor concentration of particles
Methods

- **Physical and chemical parameters**
 - PM_{2.5}, RH, T, CO₂, ACR
 - UFP – 3 x 24 hrs.
 - O₃, Levels of allergens and moulds - EDC (NFA)
- **Questionnaires**
- **Biosensors and biomarkers (KU)**

Reduction of indoor concentration of particles
Results PM_{2.5}

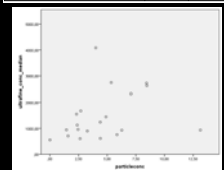
Bedroom		Living Room			
	FILTER	DUMMY FILTER			
Mean	4,74±0,77	8,32±0,78	Mean	4,48±0,65	8,32±0,65
Percentiles			Percentiles		
25	1,76	5,44	25	2,41	6,19
50	3,71	7,31	50	4,00	8,11
75	7,44	11,62	75	6,06	10,37

Reduction of indoor concentration of particles
Results PM_{2.5}

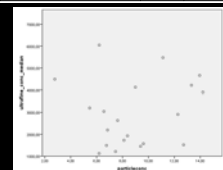
Correlation with UFP concentration

Filter (living room) Dummy filter (living room)

Correlations		particconc	ultrafineconc
particconc	Pearson Correlation	1	0,95
	Sig. (2-tailed)		0,00
	N	200	200
ultrafineconc	Pearson Correlation	0,95	1
	Sig. (2-tailed)	0,00	
	N	200	200



Correlations		particconc	ultrafineconc
particconc	Pearson Correlation	1	0,92
	Sig. (2-tailed)		0,00
	N	142	142
ultrafineconc	Pearson Correlation	0,92	1
	Sig. (2-tailed)	0,00	
	N	142	142



Reduction of indoor concentration of particles Results PM_{2.5}

Area per person

Bedroom

Correlations			
		particulate	area_per_person
particulate	Pearson Correlation Sig. (2-tailed)	1	-.278 .181
area_per_person	Pearson Correlation Sig. (2-tailed)	-.278 .181	1
	N	27	27

Living room

Correlations			
		particulate	area_per_person
particulate	Pearson Correlation Sig. (2-tailed)	1	-.319 .21
area_per_person	Pearson Correlation Sig. (2-tailed)	-.319 .21	1
	N	27	27

Filter

Correlations			
		particulate	area_per_person
particulate	Pearson Correlation Sig. (2-tailed)	1	-.368 .050
area_per_person	Pearson Correlation Sig. (2-tailed)	-.368 .050	1
	N	27	27

Dummy filter

Correlations			
		particulate	area_per_person
particulate	Pearson Correlation Sig. (2-tailed)	1	-.472 .017
area_per_person	Pearson Correlation Sig. (2-tailed)	-.472 .017	1
	N	27	27

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Reduction of indoor concentration of particles Results PM_{2.5}

Distance from the traffic street (occupant's assessment)

Bedroom (filter)

Count	distance_from_street_8		Total
	before	after	
cond1room1	2	2	4
cond1room2	4	1	5
cond2room1	5	3	8
cond2room2	1	5	6
Total	12	11	23

Living room (filter)

Count	distance_from_street_8		Total
	before	after	
cond1room1	2	2	4
cond1room2	5	2	7
cond2room1	3	2	5
cond2room2	2	5	7
Total	12	11	23

Reduction of indoor concentration of particles Results PM_{2.5}

Traffic load

Dummy filter (Bedroom)

Correlations			
		traffic_load_assessment	particulate
traffic_load_assessment	Pearson Correlation Sig. (2-tailed)	1	-.375 .078
particulate	Pearson Correlation Sig. (2-tailed)	-.375 .078	1
	N	28	28

Dummy filter (Living room)

Correlations			
		traffic_load_assessment	particulate
traffic_load_assessment	Pearson Correlation Sig. (2-tailed)	1	-.366 .086
particulate	Pearson Correlation Sig. (2-tailed)	-.366 .086	1
	N	28	28

Reduction of indoor concentration of particles Results PM_{2.5}

Gas - electric cooker

Filter (Bedroom)

Count	cooker_yes_no		Total
	before	after	
cond1room1	5	1	6
cond1room2	4	1	5
cond2room1	5	2	7
cond2room2	3	2	5
Total	17	6	23

Filter (Living room)

Count	cooker_yes_no		Total
	before	after	
cond1room1	4	1	5
cond1room2	5	1	6
cond2room1	3	2	5
cond2room2	2	5	7
Total	14	9	23

Reduction of indoor concentration of particles Results PM_{2.5}

Gas - electric cooker

Dummy filter (Bedroom)

Count	cooker_yes_no		Total
	before	after	
cond1room1	5	0	5
cond1room2	3	2	5
cond2room1	5	0	5
cond2room2	2	4	6
Total	15	6	21

Dummy filter (Living room)

Count	cooker_yes_no		Total
	before	after	
cond1room1	5	0	5
cond1room2	4	0	4
cond2room1	4	0	4
cond2room2	2	2	4
Total	15	2	17

Reduction of indoor concentration of particles Results UFP

	BEFORE	FILTER	DUMMY FILTER
Mean	29 850	14 930	13 770
Percentiles			
25	2 370	1 000	2 580
50	4 340	1 960	4 360
75	9 260	4 210	7 350

BEFORE x FILTER

p < 0,001

BEFORE x DUMMY FILTER

p = 0,306

FILTER x DUMMY FILTER

p < 0,001

Reduction of indoor concentration of particles
Results UFP

Distance from the traffic street
(occupant's assessment)

Filter


Count	distance_from_street_0	distance_from_street_1		Total
		<=50	>50	
condroom2	<752.50; <1519.00	2	5	7
ventairflow	752.50; 889.25; 1016.01	5	2	7
	2419.00	9	2	11
	752.50; 1048.5; 2419.01	2	3	5
	4125.00	2	3	5
Total	>1048.51; >4125.01	12	13	25

Dummy filter

Count	distance_from_street_0	distance_from_street_1		Total
		<=50	>50	
condroom2	<752.50; <1519.00	1	5	6
ventairflow	752.50; 889.25; 1016.01	3	2	5
	2419.00	3	2	5
	752.50; 1048.5; 2419.01	3	2	5
	4125.00	3	2	5
Total	>1048.51; >4125.01	10	11	21

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Reduction of indoor concentration of particles

Dummy filter / Filter
 VS
 ACR_{inf} / ACR_{circ}

Bedroom

Correlations		filter(dummy)	acr (vent/airflow)
filter(dummy)	Pearson Correlation	1	-.268
	Sig. (2-tailed)		.244
	N	24	21
vent(vent/airflow)	Pearson Correlation	-.268	1
	Sig. (2-tailed)	.244	
	N	24	24

Living Room

Correlations		filter(dummy)	acr (vent/airflow)
filter(dummy)	Pearson Correlation	1	.237
	Sig. (2-tailed)		.359
	N	24	17
vent(vent/airflow)	Pearson Correlation	.237	1
	Sig. (2-tailed)	.359	
	N	24	24