LSC 2011 Abstract: Combined nasal exposure to sodium hypochlorite and ovalbumin induces airway hyperreactivity in mice through activation of the TRPA1 channel and mast cells
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**Background:** Some epidemiologic studies have indicated that attendance to chlorinated swimming pools is associated with bronchial hyperreactivity, allergies and asthma.

**Aim:** To investigate the effects of NaClO, the main pool disinfectant, on allergic sensitization and airway responses in mice.

**Methods:** Male BALB/c mice received 1 to 7 nasal instillations of ovalbumin (OVA, 1%) on alternate days 10 min after instillation of NaClO (3 ppm active...
P3315 Endotoxin exposure protects against new onset of pollen sensitisation
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Background: Farmers are exposed to a wide range of organic and microbial components. We studied the relation between farm-related endotoxin exposure and changes in atopic sensitisation over time in young adults in The Danish Farming Cohort (SUS).

Method: The SUS cohort (n=1166) was examined twice with a 15 year follow-up period. Specific IgEs against cat, bird, grass, HDM and storage mite allergens were determined (ADVIA Centaur, ALK Abelló). Sensitisation was defined as an IgE≥0.35 kU/L, and atopy was defined as sensitisation to one or more of the 5 allergens tested. Personal average yearly exposure to endotoxin during the follow-up period was estimated from more than 500 personal inhalable dust measurements and a farm-specific internal job exposure matrix.

Results: New onset atopy was negatively associated with endotoxin exposure in a dose dependent manner (Table 1). Endotoxin exposure was not seen to be related to new onset of mite sensitisation. In contrast, all levels of endotoxin exposure showed a significant and strong protective effect against new onset of pollen sensitisation.

Table 1. Logistic regression analysis on endotoxin and new onset sensitisation

<table>
<thead>
<tr>
<th>Endotoxin</th>
<th>Atopy OR (95% CI)</th>
<th>Pollen OR (95% CI)</th>
<th>Mites OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 quintile</td>
<td>0.73 (0.37–1.46)</td>
<td>0.56 (0.16–0.73)</td>
<td>2.28 (0.94–5.55)</td>
</tr>
<tr>
<td>3 quintile</td>
<td>0.39 (0.17–0.91)</td>
<td>0.14 (0.06–0.36)</td>
<td>1.47 (0.57–3.83)</td>
</tr>
<tr>
<td>4 quintile</td>
<td>0.49 (0.22–0.91)</td>
<td>0.21 (0.09–0.47)</td>
<td>1.14 (0.41–3.55)</td>
</tr>
</tbody>
</table>

*p<0.05. The model is adjusted for farm childhood, familial atopic disposition, pets and smoking status.

Conclusion: These analyses suggest endotoxin exposure to have a significant protective effect against new onset of pollen sensitisation.

P3316 Reduction of diesel exhaust-induced health effects by using a vehicle cabin air inlet filter
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Exposure to air pollution is associated with adverse health effects. During exposure in traffic, air pollution concentrations may reach levels that cause symptoms and abort diseases. One way to counteract such effects can be to use an air inlet filter in order to prevent particles and gases from entering the vehicle cabin. The aim of the present study was to evaluate the efficacy of two filters to reduce diesel exhaust DEI related health effects.

Material and Methods: 30 allergic and non-allergic subjects were exposed in an exposure chamber on four occasions during 1 hour; to filtered air, unfiltered DEI filtered with PM10, of 340 μg/m3, DEI filtered with an ultratine particle (UFP) filter and a UFP filter with active charcoal (UFP+AC), in random blinded order.

Results: The UFP filter reduced PM10 by 46%, while the UFP+AC filter not only reduced PM10 by 74% but also NO2 by 75% and hydrocarbons by 50%. Headache, dizziness, eye irritation, nasal irritation, unpleasant smell and throat irritation increased significantly after exposure to unfiltered diesel exhaust compared to filtered air. Symptoms were significantly reduced by the UFP+AC filter and were also associated with small but significant improvements in lung function (FEV1, FEF25-75). The UFP filter without charcoal was far less efficient.

Conclusions: The combination filter (UFP + active charcoal) significantly reduced ultrafine particle, NO2 and HC concentrations from diesel exhaust, and significantly improved symptoms and lung function. The study indicates that vehicle cabin air inlet filters should not only contain an ultratine filter component, as the addition active charcoal was necessary to improve symptoms and respiratory health.
Osteopontin and soluble mesothelin-related peptide levels in malignant and benign diseases due to environmental asbestos exposure and healthy people with environmental asbestos exposure

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Objective: To determine osteopontin and soluble mesothelin-related peptide (SMRP) levels in malignant mesothelioma (MM) patients, in subjects with pleural plaques (PP) due to environmental asbestos exposure and in healthy subjects with environmental asbestos exposure.

Methods: Blood samples were taken from 279 residents from villages close to ophiolitic units (OU) (serpentin asbest containing) with PP on chest X-ray, 123 healthy subjects from villages close to OU, 120 healthy subjects from villages >26 km distant to OU and 24 MM patients.

Results: Mean serum osteopontin levels for MM, PP, asbestos-exposed healthy subjects and healthy subjects not exposed to asbestos were 21.207, 8.956 and 9.725 ng/L respectively. Mean serum SMRP levels for MM, PP, asbestos-exposed healthy subjects and healthy subjects not exposed to asbestos were 4.59, 1.10, 1.11 and 1.12 ng/L respectively. Mean levels of both biomarkers were significantly higher in MM patients than in subjects with PP and healthy subjects with environmental asbestos exposure. The two biomarkers have no superiority to each other.

Adipokine adipin is associated with the degree of parenchymal fibrosis in asbestos-exposed patients

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Asbestos causes an inflammatory response in the lungs, that can lead to pulmonary fibrosis called asbestosis. Most of the asbestos-exposed subjects show either normal or borderline parenchymal changes in high resolution computed tomography (HRCT). The significance of these borderline changes and their relation to pulmonary inflammation are not known. Adipokines regulate inflammatory responses and they are secreted by adipocytes and macrophages, while alveolar macrophages are known to be involved in asbestos-related lung inflammation. We assessed if adipokines are associated with the degree of pulmonary fibrosis in asbestos-exposed patients.

We measured adipin, adiponectin, leptin, resistin, IL-6 and IL-8 in blood, lung function, and thorax-HRCT in 85 men with a history of moderate or heavy occupation of asbestos-exposure. The subjects were divided into three groups based on the HRCT-finding: normal, borderline or fibrosis.

There was an increasing linear trend in the plasma levels of adipin (p<0.0001) and adiponectin (p=0.0083) between the three groups, i.e. the more parenchymal changes on HRCT the higher the levels of adipin and adiponectin. Adipin levels correlated positively with the serum levels of IL-6 and the extent of pleural plaques on HRCT. Adipin levels correlated negatively with TLO, i.e. the higher the adipin, the lower the pulmonary transfer factor. Leptin or resistin were not associated with the degree of parenchymal fibrosis.

In conclusion, adipokine adipin was associated with the degree of parenchymal fibrosis and inflammatory activity in asbestos-exposed subjects, suggesting that adipin may have a role in the pathogenesis of asbestos-induced lung injury.

Intratracheal fiber glass instillation in rats: Bronchoalveolar lavage interleukin8 levels

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Objective: To determine interleukin8 (IL-8) levels in bronchoalveolar lavage fluid (BALF) after intratracheal fiber glass instillation in rats.

Methods: Forty female Wistar rats were included in the study. The animals were divided into three groups per 8 exposed to different doses of fiber glass and one control group. First group (1-8) was exposed to lung dust of 0.2 mg/ml saline 5days/week 10 weeks, the second (9-16) group was exposed to 10mg/0,2 ml saline 5 days/week 10 weeks, the third group (17-24) was exposed to 12 mg FG/ml saline solution 5 days/week 10 weeks and the control group (25-32) was exposed to the same volume of saline. The fibers had been size selected to be rat respirable: length <25 µm and diameter ≤1 µm. After exposure period of 10 weeks the rats were killed one week after the last exposure. Following preparation of the lungs, they were being washed with 2,5 ml saline without muscle. The lavage fluids were collected in calibrated tubes and harvested volume was recorded. Supematant was obtained after centrifugation at 1500 r.p.m for 5 minutes and i8 levels were measured. IL-8 levels were ranged between 12.3-20.2 pg/ml at the control group, 15.8-40.6 pg/ml first group, 33.86-86 pg/ml second group and between 46.5-132 pg/ml. These findings indicate that i8 levels were dose related and also correlated with lavage cytology and histopathological findings.

Enhanced inflammatory response to formaldehyde in human bronchial epithelial cells

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Formaldehyde (FA) is known as a major chemical substance that may induce sick building syndrome (SBS). The mechanism underlying development of SBS has not been fully elucidated. We hypothesized that low doses of FA may be harmless when airway is intact, but may enhance inflammation when airway is affected by other factors such as microorganisms. A human bronchial epithelial cell line, BEAS2B cells were exposed to FA (1-10 µM) before and after poly(I:C) (10 µg/ml) stimulation. Expression levels of mRNA of IL-8, RANTES and TLR3 mRNA were measured by real-time RT-PCR and their protein concentrations were determined by using ELISA. Cell signaling pathways possibly involved in the response were further analyzed by Western blotting.

FA after poly(I:C) stimulation significantly enhanced IL-8 mRNA expression and increased IL-8 protein concentrations to lesser extent. Phosphorylation of extracellular signal-regulated kinase (ERK) and c-Jun N-terminal protein kinase (JNK) was enhanced in the cells exposed to FA after poly(I'C) stimulation, whereas p38 MAP kinase was unaffected. This in vitro model suggests that effect of FA is small in normal conditions, but may enhance inflammatory response in pathological conditions via selective activation of inflammatory cell signaling molecules. It may provide insights into pathogenesis of SBS.
P3322 Impact of traffic-related air pollution on pulmonary oxidative stress
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Exposure to traffic-related air pollutants is known to increase morbidity and mortality. The aim of the study was to evaluate the impact of air pollution on oxidative stress of police officers.

An observational prospective study on traffic police officers and controls was performed since August 2009 to March 2010 in Monza, Italy. Active smokers and asthmatics were excluded from the study. 8-isoprostane (8-iso) values were evaluated on exhaled breath condensate during both summer and winter periods. 8-iso values and pulmonary function test (PFTs) were correlated to air pollution values detected by fixed measurements stations during one-month period before the visits. The TOCA project1 supported by Carpiol Foundation. A total of 17 officers (9 males; 41±1.4 yrs, mean±SE) and 15 controls (5 males; 34.4±2.4 yrs) were enrolled in the study. 8-iso values in officers were 5.30±0.83 and 12.43±0.98 pg/mL (mean±SE), respectively, in summer and winter period (p<0.0001). No difference in 8-iso mean values was found among officers and controls during winter-time (12.43±0.98 vs. 12.78±1.87 pg/mL, respectively, p=0.75). Among the entire study population, significant positive correlations were found between 8-iso values and mean values of each air pollutant, respectively, in winter and summer period (p<0.0001). The percent black carbon content in PM as an effective metric for evaluating air pollution impact and as a possible measure of local emissions was identified as the most promising metric. This metric is closely associated with diesel emissions in urban areas and as such may be an easily measured surrogate of this toxic pollutant.

P3325 Prolonged exposure to low levels of microcystin-LR triggered pulmonary oxidative stress regardless of occupational risks.
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Introduction: Prolonged exposure to low levels of microcystin-LR (MCYST-LR) has been reported to cause pulmonary toxicity. Previous studies have reported a higher incidence of lung disease in the occupational population compared to the general population. However, the impact of MCYST-LR exposure on occupational and non-occupational populations is still largely unknown. The aim of this study was to investigate the impact of low levels of MCYST-LR exposure on pulmonary oxidative stress in mice.

Methods: Male Swiss mice (25-30 g) were daily intranasally instilled with 50 nM of MCYST-LR. Lungs and nasal cavity were prepared for histological analysis (hematoxylin-eosin and alcin blue, respectively). Results: TOX showed higher static elastance and viscoelastic component of the lung (15.1±4 and 5.2±0.4 cmH2O/mL, respectively). Toxic and control mice showed no differences in alveolar collapse or polymorphonuclear cell content.

Conclusions: Low levels of MCYST-LR triggered pulmonary oxidative stress in mice, regardless of occupational status. This finding has important implications for the occupational health and safety of workers exposed to MCYST-LR. Further studies are needed to investigate the long-term effects of low-level MCYST-LR exposure on pulmonary function and oxidative stress in humans.
monary tissue mechanical impairment, damage to lung histology and secretory changes in the nasal cavity of mice. Thus, frequent exposure to low levels of MCYST-LKR can damage the respiratory system and should be avoided. Supported by: CNPq, FAPERJ, MCT

P3327 Chonic exposure of diesel exhaust particles causes alveolar enlargement in mice
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In urban centres, diesel exhaust particles (DEP) are the most toxic pollutant released from automotive engines, affecting pulmonary health. The aim of this study was to investigate the effects of a chronic period of exposure to DEP (three months) in healthy mice (Yoshizaki et al., 2010) studying whether chronic, near-ambient levels of DEP exposure could induce changes in the lung parenchyma structure and in the profile of inflammatory cells. Male Balb/c mice were divided into two groups: 1) nasal instillation of 10 μL of saline (n=8) (control group) and 2) nasal instillation of 30 μg/10 μL of DEP (n=9) (DEP group). Nasal instillations were performed five days a week for three months. Lung parenchyma was evaluated by quantifying the mean airspace chord lengths (Lm) by morphometry (point counting). T lymphocytes total (CD3) and macrophages (Mac-2) densities were analyzed by immunohistochemistry. DEP exposure induced increase of CD3 T lymphocytes in DEP when compared to Control (p=0.028); no statistical difference was found in macrophages density. The Lm was larger in DEP animals than controls (p=0.018). These findings indicate that chronic, near-ambient levels of DEP exposure can cause alveolar enlargement and T lymphocytes recruitment, providing a biological link between DEP exposure and the emphysema.

P3328 Changes in exhaled breath condensate pH following specific inhalation challenge in patients with occupational asthma to persulfate salts
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Introduction: Exposure to persulfate salts in hairdressing professionals is one of the most common causes of occupational asthma (OA) in our setting. pH measurement in exhaled breath condensate (EBC) has proven to be a useful, noninvasive method for monitoring pulmonary inflammation. This study investigates possible changes in EBC pH in patients with OA to persulfate salts following specific inhalation challenge (SIC) testing.

Material and methods: The study population included 13 patients with OA caused by exposure to persulfates, diagnosed by a positive SIC (Group 1) and 25 patients exposed to persulfates, but with a negative SIC (Group 2). EBC samples were collected before and after SIC was performed. pH was determined in all samples following degasification with helium.

Result: The mean (SD) EBC pH values before and after SIC were 7.65 (0.63) and 7.32 (0.85), respectively, in Group 1, and 7.73 (0.68) and 7.88 (0.66) in Group 2. There were no significant differences in the pH values between the 2 groups. However, a decrease in EBC pH greater than 0.4 units following SIC was established as significant; 6 patients in Group 1 (46%) and only 1 patient in Group 2 (4%) exceeded this value.

Conclusions: Persulfate salts can induce an inflammatory response in patients with OA. A larger percentage of SIC-positive patients showed a significant EBC pH decrease following the test. This fact could contribute to improving the diagnostic yield of SBC.

This study was funded by grants from the Spanish Ministry of Health (FIS PI050100) and SEPAR.

P3329 Toxicity of wood smoke and diesel exhaust in a whole blood assay
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Combustion particles can cause detrimental effects on human health. Studies have focused on diesel exhaust but increased exposure to biomass combustion in affluent regions in addition to the widespread exposure in less affluent regions of the World stresses the need for more research on a wider range of pollutants.

A 3-h controlled exposure of 6 human volunteers to wood smoke (WS) at 300 μg/m³ from good combustion conditions was conducted. Venous blood sampled right after exposure and 48 hr earlier was used in a whole blood assay. In the assay, suspended combustion particles were added to the blood and selected inflammation-related proteins were measured after incubation. Combustion parti-