ASPHALT EXPOSURE ENHANCES SUBSTANCE P (SP) LEVELS IN SENSORY NEURONS PROJECTING TO NASAL EPITHELIUM.

E.R. Sikora[1], S. Stone[2], S. Tomblyn[2], D.G. Frazer[2], V. Castranova[2] and R.D. Dey[1]. Department of Anatomy, West Virginia University[1] and HELD, NIOSH[2], Morgantown, WV, 26506.

Asphalt fumes have been reported to cause nasal irritation in road crew workers. Since inhaled irritants may increase SP production in the airways, the effects of asphalt fumes on sensory neurons innervating the rat nasal epithelium were investigated. Cell bodies of trigeminal ganglia (TG) providing sensory innervation to nasal epithelia were identified by instillation of 8 µl of rhodamine-labeled latex microspheres to all rats ten days prior to sacrifice. Two separate asphalt exposure studies were conducted. In the first (n=8 per group), Fischer 344 rats were exposed to an asphalt fume concentration of 10.4 mg/m^3, five consecutive days, 3 hr/day. In the second (n=7/group), Sprague-Dawley rats were exposed to a fume concentration of 16.0 mg/m^3, 5 consecutive days, 3.5 hr/day. The nasal cavities were lavaged and the TG removed and processed for SP immunoreactivity (IR) in both studies and CGRP-IR in the second study. The percentage of SP-IR neurons projecting to the nasal epithelium in the first study was 71.6 in asphalt-exposed rats and 49.1 in controls. In the second study, the percentage of SP-IR neurons was 83.7 following asphalt and 58.5 in controls. The percentage of CGRP-IR in the second study increased from 49.7 in control to 65.3 following asphalt. Therefore, exposure to asphalt fumes results in an increase in SP and CGRP in TG neurons projecting to the nasal epithelium. Enhanced sensory neuropeptide release from nerve terminals in the nasal cavity may mediate neurogenic inflammation associated with nasal irritation following exposure to asphalt fumes.

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NITRIC OXIDE AND CONCENTRATION OF INTERLEUKIN-4 DETERMINED FROM NASAL LAVAGE FLUID PREDICT INFLAMMATORY STATUS OF LOWER AIRWAYS

M.Purokivi[1], M.-R. Hirvonen[2], J.Randell[1], M. Roponen[2], H. Tukiainen[1]. [1]Dept. of Respiratory Medicine, Kuopio University Hospital and [2]Laboratory of Toxicology, National Public Health Institute, Kuopio, Finland

The inflammatory processes in the nasal air passages may reflect those in the lower airways due to similar histology in nasal mucosa and in lower airways. Objective of the current study was to determine whether the levels of inflammatory markers in nasal lavage were predictors of lower respiratory tract inflammation. Differential cell count, concentrations of cytokines (IL-1, IL-4, IL-6, TNFα) and nitric oxide (NO) assessed as nitrite, were analysed from nasal lavage fluid (NL) and induced sputum (IS) samples of occupants of two school buildings (n=60). Measurements of inflammatory markers in NL and IS sample pairs, collected on the same day, were compared using Chi square test, Fisher's exact test and regression analysis. Levels of NO (p=0.026) and IL-4 (p=0.014) were significant predictors for their levels in IS. There was no significant correlation between concentrations of the other studied cytokines and differential cell types in NL and IS samples. These results suggest that NO and IL-4 measurements in NL may be useful in evaluating the inflammatory status of lower airways.

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TITLE UPPER RESPIRATORY RESPONSES TO FUNGAL EXPOSURES

Chih-Hung Ku*, Louise Ryan, Harriet Burge, David Christiani, School of Public Health, NDMC*, Taipei, TAIWAN, ROC; Harvard School of Public Health, Boston, MA, USA

INTRODUCTION To study upper respiratory responses to fungal exposures, we conducted a short-term repeated-measurement study of workers in rice fields and offices in Taiwan.

METHODS Airborne fungi in each working environments were collected daily by a personal pump and dilution-cultured in duplicate on DG-18 (Dichloran with 18% Glycerol Agar). Leukocytes in nasal cavities were washed out from both cavities, centrifuged, and examined under oil immersion, on the first and the last days.

RESULTS Airborne fungal concentrations were significantly higher in the rice fields than in the offices. Regression analysis indicated a work-site effect and a time effect on the absolute nasal leukocyte counts, but no interaction between these variables. Both rice field and office groups had significantly higher levels of nasal leukocytes after 8-day exposures, compared to baseline measurements. After adjusting for confounders (previous dust-exposure history, previous respiratory-disease history, cigarette smoking, skin test reactivity), workers in the rice fields had levels of nasal leukocytes 13 times higher than those found in office workers. Moreover, The regression analysis indicated that with a one-unit/m^3 increase in fungal CFU increases nasal leukocytes by 1.0448 cells/ml in workers in both groups.

CONCLUSIONS Our study suggests that fungal exposure is a respiratory hazard in harvesting activities. The nasal cavity is the first target of ambient pollutants and irritants and also provides the first line of human defense against these agents. Therefore, nasal lavage yields appropriate samples for measuring acute upper respiratory responses after pollutant exposure.

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IgE epitope of vinyl sulfone reactive dyes-human serum albumin complex

JW Park, DB Kang, SY Choi, KS Kim, C-S Hong. Institute of Allergy, Department of Internal Medicine, Yonsei University, Seoul, Korea

RATIONALE: Vinyl sulfone reactive dye (RD) can elicit IgE mediated occupational asthma by haptenation. The dye consists of vinyl sulfone reactive group and chromogen. Although the RD-human serum albumin (HSA) complex have been known as the most reliable agents for detection of specific IgE, the characters of IgE epitopes are not well known.

METHODS: We analyzed the characters of IgE epitopes of RD-HSA with ELISA, native and SDS-PAGE with the sera of 6 reactive dye occupational asthma (RD-OA).

RESULTS and CONCLUSIONS: Heating the RD-HSA at 100°C for 5 minutes, markedly decreased the IgE allergenicity in 5 out of 6 sera of RD-OA. Same results were obtained by complexing the RD with preheated HSA. Mercaptoethanol markedly affect the allergenicity of RD-HSA complex in all 6 RD-OA sera. Immunoblotting from native PAGE showed strong IgE affinity to RD-HSA complex but the immunoblotting from denaturing SDS PAGE did not showed the IgE affinity. Among 6 RD-OA sera, 2 sera showed weak IgE affinity to reactive group (vinyl sulfone) – HSA complex. With these results, we considered that the conformational structure of HSA would be critical in the formation of IgE epitopes during the haptenation process and the reactive group of the vinyl sulfone might participate for the formation of IgE epitope in some RD-OA patients. Our results also confirmed the heterogeneity of IgE epitopes in RD-HSA complex.

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THE MAJORITY OF WORKERS PRESENTING WITH OCCUPATIONAL ASTHMA DO NOT HAVE SPUTUM EOSINOPHILIA

W Anees, P S Burge, V Huggins, I Pavord[1], A Robertson. Birmingham Heartlands Hospital, Birmingham, UK. [1]Glenfield Hospital, Leicester, UK

Whilst sputum eosinophilia is characteristic of asthmatic individuals, the sputum cellular profile of workers with occupational asthma (OA) is less well described. Aim: To describe the sputum cellular profile of subjects with OA and relate this to physiological measures of airway obstruction. Methods: Consecutive patients with objective evidence of OA were invited to attend for sputum induction. An adequate sample was obtained in 33 cases. 31/33 had serial peak expiratory flow records diagnostic of OA (Oasys 2 score >2.5). 10 of the cases underwent specific bronchial challenge tests, all of which were positive. Causative agents included: oil mists (5 cases), welding fumes (4), cobalt (4), isocyanates (4), chrome (3). Only 1 case was a known high molecular weight agent. Cases underwent sputum induction with nebulised hypertonic saline within 24 hours of being exposed at work for 3 consecutive days. Results: Of the 33 cases, 88% were male, mean age 46 years. 63% were atopic. 61% were on inhaled corticosteroids. 39% had normal non-specific bronchial reactivity. Median cell counts (interquartile range) were: neutrophils 60.4% (39-70%), eosinophils 1% (0.2-3.8%), macrophages 33% (27-49%). Only 36% of subjects had a sputum eosinophilia (≥ 3%). Those with sputum eosinophilia had worse symptoms, lower pre-bronchodilator FEV_1 (61 vs 80 % predicted, $p<0.01$), greater reversibility (24 vs 7 %, $p<0.01$) and a lower methacholine PD_{20} (geometric mean 224 mcg vs 1000 mcg, $p<0.05$). Conclusion: The majority of workers presenting with occupational asthma do not have a sputum eosinophilia though sputum eosinophilia is associated with more severe disease.

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THE USE OF INDUCED SPUTUM IN THE DIAGNOSIS OF OCCUPATIONAL ASTHMA.

RH Green, CE Brightling, G Woltmann and ID Pavord. Institute for Lung Health, Glenfield Hospital, Leicester, U.K.

It has been suggested that the use of induced sputum may help to establish the diagnosis of occupational asthma (OA). We prospectively investigated 23 consecutive patients referred to our clinic with a diagnosis of possible OA. Methacholine challenge testing and sputum induction was performed at work and after a 2 week period away from work and patients were asked to complete 2 hourly peak flow readings throughout this period. Peak flow charts were examined using the OASYS-2 computer analysis programme. Occupational asthma (OA) was diagnosed if there was a history of symptoms developing following exposure to a sensitising agent with a latent period along with either a two-fold or greater fall in methacholine PC20 at work compared with away from work and/or an OASYS-2 score of 2.51 or greater. Work aggravated asthma was diagnosed if symptoms developed soon after exposure to an irritant in subjects who had pre-existing asthma and no change in methacholine PC20 at work. OA was diagnosed in 8 patients, work aggravated asthma in 12 and in 3 patients the diagnosis remained uncertain. 4 patients failed to provide adequate peak flow charts, 2 patients failed to attend for repeat tests and 3 patients left the workplace before their investigations were complete. A further 6 patients were unable to expectorate a satisfactory sputum sample on 1 of the 2 visits. In the remaining patients there was no significant difference in the median (IQR) sputum eosinophil count when at work compared to the period away from work in either the group with OA (3.6% (3.3) versus 2.8% (6.7)) or the group with work aggravated asthma (4.2% (23.9) versus 5.8% (8.0)). Objective confirmation of the diagnosis of occupational asthma is difficult, partly due to poor patient compliance. Deterioration in eosinophilic airway inflammation does not appear to be a feature of occupational asthma even when there is evidence of exposure to a sensitising agent and increased airway responsiveness at work.

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ABSTRACTS

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