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adjusted the effect of SO_2 and/or NO_2. The mean peak expiratory flow rate of the exposed schoolchildren in dusty days was much lower than that in the control days ($P < 0.01$).

Conclusion: It suggests that PM_{10} and $PM_{2.5}$ derived from the dust events could adversely impact on the respiratory and cardiovascular health of the exposed schoolchildren and sensitive population in China.

S-29B1-5

Different Mortality of Ischemic and Hemorrhagic Stroke in Relation to Outdoor Temperature

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Background/Aims: Outdoor temperature has been reported to have a significant influence on the seasonal variations in mortality of stroke, but different mortality of ischemic and hemorrhagic strokes in response to outdoor temperature was not evaluated. The main goal of the study was to examine the effect of temperature on ischemic and hemorrhagic strokes, particularly for extreme temperature.

Methods: We investigated the association between outdoor temperature and stroke mortality in Seoul during 1992–2007. We used time series analysis of the counts for ischemic and hemorrhagic stroke deaths by means of the generalized additive and generalized linear models, and estimated the % change of mortality associated with 1°C increase in outdoor temperature.

Results: The estimated % change of mortality for hemorrhagic cerebral disease were 0.36 (95% CI: −0.08, 0.81) below 10°C and −0.53 (−1.06, 0.0) at 10°C or higher with 1°C increase in outdoor temperature. For the ischemic cerebral disease, the estimated % changes were 0.59 (0.25, 0.93) below 23°C and 3.30 (2.22, 4.38) at 23°C or higher.

Conclusion: These findings support the hypothesis that mortality of ischemic and hemorrhagic strokes show different patterns in relation to outdoor temperature. The ischemic stroke is more responsive to outdoor temperature and both extreme temperatures, cold and hot, were harmful for ischemic stroke.

S-29B1-6

Temperature-related Mortality in Australian Cities

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Background/Aims: Deaths from heat extremes are already important in Australia, and will increase under global warming. In all, 1500 people die from heat extremes in Australian cities and this could treble by mid-century (Research Australia 2007). Many studies have quantified the increase of mortality in response to extremes of heat. Nicholls et al. (2007) found that when mean daily temperature exceeds a threshold of 30°C (mean of today's maximum temperature and tonight's minimum temperature), the average daily mortality of people aged 65 years or more is about 15%–17% greater than usual. Fewer studies have given equal attention to mortality arising from extremes of cold, which can be expected to fall under as the climate warms. The present study considered the effects of heat and cold on mortality in each capital city of Australia.

Methods: Daily all-cause mortality was modeled as a function of recent daily maximum and minimum temperatures. Linear and quadratic relative risk functions were compared. For each city, 2 threshold temperatures were estimated by maximum likelihood: one for cold and the other for heat. Variations in both thresholds and relative-risk parameters, by age-group and by season of the year, were investigated.

Results: Different mortality-temperature response functions were found in each capital city. The increase of risk in response to cold was well modeled by a linear function (ie, constant relative risk per degree), but the effects of extreme heat increase more rapidly than this, and were better modeled as proportional to the square of temperature above the local threshold.

Conclusion: In assessing the likely impacts of climate change on mortality, it is important to consider local conditions which affect the susceptibility of the local population to heat. It is also important to include in such calculations allowance for the ameliorating effects of reduced mortality from cold, which is not negligible even in the warmer northern cities of Australia.

WORK ENVIRONMENT AND RESPIRATORY EFFECTS

O-29A2-1

Early Symptoms of Airways Inflammation Among Young Bakers, Pastry Cooks, and Hairdressers

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Background/Aims: Bakery, pastry-cooking, and hairdressing are occupations at risk of asthma. Airways inflammation occurs soon after inception of exposure. This study assesses how asthma-like symptoms develop along the first years of activity among young workers.

Methods: Following a retrospective follow-up design, 6 cohorts of bakers or pastry cooks and hairdressers of increasing time since admission in 9 vocational schools (2001–2006) underwent telephone interviews on the occurrence of respiratory symptoms. A group of young workers who graduated in the same schools in 2001 and had occupations not exposed to known airways irritants or allergens served as a reference group.

Results: Eight hundred twenty-six subjects were interviewed (mean age of 25.5 years, 44.4% females). The prevalence of asthma-like symptoms is greater among bakers or pastry cooks and hairdressers than among the referent group (15.8% and 19.6% vs. 9.4%, respectively, $P = 5\%$), as well as ENT symptoms (11.3 and 12.8 vs. 2.1, $P = 1\%$). Asthma-like symptoms show an increasing trend with duration of exposure since entry in apprenticeship of bakers or pastry cooks (prevalences step from 11 to 21% along the 4 quartiles of the duration distribution [from 36 to 115 months], P for trend = 4%), with similar findings for ENT symptoms. Prevalences, already high in the first exposure duration category, stay even long time among hairdressers. In a subsample of subjects who underwent home medical visits (n = 165), fractional concentration of exhaled nitric oxide values are greater among subjects exposed to flour dust (17.3 ppb [SE = 14.0], 11.6 [7.0] and 9.8 [4.5], respectively, across the 3 occupation categories, $P = 0.001$).

Conclusion: Incidence of asthma-like symptoms starts soon after engaging in bakery, pastry cooking, and hairdressing, especially early among subjects in the latter whose activity entail exposure to low molecular weight agents, and with some delay among the former, an observation that might express different underlying mechanisms.

O-29A2-2

Considerations of Peak Exposure Indices for the Epidemiology of Beryllium Sensitization

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Background/Aims: Short-term "peak" exposures can potentially overwhelm the capacity of normal defense mechanisms and induce adverse health effects. Peak exposures may be particularly relevant to susceptible beryllium-exposed individuals as exceeding an exposure threshold may activate an immune response that leads to beryllium sensitization (BeS). Exposure indices currently used in epidemiologic studies of BeS generally do not reflect peak exposures. There is little consensus in the literature as to what constitutes a biologically-relevant peak exposure. Furthermore, real-time monitoring methods are lacking for beryllium requiring alternative methods for investigating peak exposures.
Methods: A stochastic approach was used to develop measures of peak exposure using full-shift beryllium exposure data (n = 4026) collected for 269 jobs at a beryllium manufacturing facility. The geometric standard deviation (GSD) was used as an indicator of the likelihood that a specific job could experience exposure excursions. This was combined with the geometric mean (GM), an indicator of the likelihood that a job exposure will exceed a biologically-relevant threshold. The combined GM-GSD measure indicates the likelihood that workers in a job will experience peak exposures. Additional indices of peak exposure for jobs include: the 95th percentile; and the fractions of job-specific measurements that exceeded occupational exposure limits (0.2 $\mu g/m^3$ or 2 $\mu g/m^3$). The relationships among these indices of peak exposure were evaluated using correlation coefficients and kappa statistics.
Results: The combined GM-GSD metric and the categorized 95th percentile showed poor agreement (κ = 0.04). Pearson correlation coefficients for the 2 exceedance fractions and the 95th percentile ranged from 0.33 to 0.65. The degree of agreement among these exposure metrics suggests that each may reflect different aspects of peak exposure, and therefore could prove useful in exploring exposure-response relationships in epidemiologic studies of BeS.
Conclusion: Understanding peak exposures and the relationship of such exposures to immune-mediated biological responses may permit a more effective and targeted prevention strategy.

O-29A2-3

Respiratory Health and the Effectiveness of an Intervention Programme on Printing Workers Exposed to Organic Solvent

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Background/Aims: A prospective study was carried out to determine the status of lung functions among printing workers who are exposed to solvent. An intervention program was carried out in order to educate the workers on the hazards of solvent.
Methods: Of the 60 workers, 54 were followed up for their lung functions, as another 6 had left factory. These workers worked in the production line. They were exposed to solvent for almost 2 years from the last measurement of the lung functions. Questionnaire was used to obtain information on sociodemographic background. Spirometer model Chestgraft HI-101 was used to execute the lung function test. Validated questionnaire on knowledge and practices were used for the intervention program.
Results: Lung function parameters: FEV1% predicted, FVC% predicted, and FEV1/FVC% predicted showed significant difference between previous data and present findings ($P < 0.001$, $P = 0.011$, $P = 0.004$) before and after the intervention.
Conclusion: The comparison between previous lung functions with the present data showed significant impairment. The respondents were identified as having obstructive lung functions over 2 years' exposure to the organic solvent. The effectiveness of the intervention program was proven as there was a significant difference in the scores obtained before and after the intervention.

O-29A2-4

Mortality Among Brazilian Miners During 1979–2005

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Background/Aims: In Brazil, a great variety of minerals are extracted and processed in different regions of the country. This occupational activity may expose workers to some risk factors such as coal dust, noxious gases, lack of oxygen, high temperature, and radioactivity. The aim of this study was to evaluate the mortality by respiratory disease (RD) and lung cancer (LC) among Brazilian miners, during 1979–2005. In addition, we compared this mortality with that experience by 2 reference populations: Brazilian general population and Brazilian occupied population.
Methods: To do so, we calculated the mortality odds ratio (MOR) stratified by age (20–39; 40–59; 60+ yrs old) and periods of death (1979–1987; 1988–1996; 1997–2005).
Results: The results showed that, when compared to the general population, youngsters miners had an increased risk of dying by RD, along all 3 periods of analysis (1979–1987: 0; 1988–1996: MOR, 31.95; 95% confidence interval [CI] 8.69–81.80; 1997–2005: MOR, 36.57, 95% CI: 11.85–85.21). On the other hand, in the total population of miners, a decreased risk of RD was observed when compared to the reference populations in all 3 periods of analysis (1979–1987: MOR, 25.55; 95% CI: 16.20–38.32; 1988–1996: MOR, 13.99, 95% CI: 10.38–18.46; 1997–2005: MOR, 9.40; 95% CI: 7.38–11.94). Moreover, when compared to the general population, Brazilian miners also showed an increase in the risk of death by lung cancer across the studied period (1979–1987: MOR, 1.14; 95% CI: 0.72–1.72; 1988–1996: MOR, 1.60; 95% CI: 1.18–2.11; 1997–2005: MOR, 1.53; 95% CI: 1.25–1.86).
Conclusion: Our results suggest that, when compared to general population, Brazilian miners are at increasing risk to die by RD and LC.

O-29A2-5

Microbial Exposure Assessment in Sawmill, Livestock Feed Industry, and Metal Working Fluids Handling Industry

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Background/Aims: The objective of this study is to investigate the distribution patterns and exposure concentrations of bioaerosols in industries suspected to high levels of bioaerosol exposure.
Methods: We selected 11 plants including 3 livestock feed plants, 3 metal working fluids (MWFs) handling plants, and 5 sawmills and measured total airborne bacteriae, fungi, endotoxin as well as dust. Airborne bacteriae and fungi were measured with 1 stage impactor, 6 stage cascade impactor, and gelatin filters. Endotoxin was measured with polycarbonate filters.
Results: The geometric means (GM) of a airborne concentration of bacteriae, fungi, and endotoxin were 1864, 2252 CFU/m^3, and 31.5 EU/m^3,respectively, at the saw mill industry, followed by the livestock feed industry (535, 585 CFU/m^3, and 22.0 EU/m^3,respectively) and MWFs handling industry (258, 331 CFU/m^3, and 8.7 EU/m^3,respectively). They were statistically significantly different ($P < 0.01$). The ratio of indoor to outdoor concentration was 6.2, 1.9, 3.2, and 3.2 for bacteria, fungi, endotoxin, and dust in livestock feed industry, 5.0, 0.9, 2.3, and 12.5 in MWFs industry, 3.7, 4.1, 3.3, and 9.7 in sawmill. The respiratory fractions of bioaerosols were differed by bioaerosol types and industry types: respiratory fraction of bacteria comprised 59.4%, 72.0%, and 57.7% in livestock feed industry, MWFs handling industry and sawmill industry respectively. For fungi, respiratory fraction occupied 77.3%, 89.5%, and