

# 3<sup>rd</sup> Session

## Epidemiologic studies

(Chairs: Shin Yamazaki and Haidong Kan)

## **Adverse health effects of air pollution: mortality and quality of life**

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Numerous studies have found associations between ambient air pollution and various outcomes including mortality, hospitalization for respiratory disease, lung function, and incidence of respiratory symptoms. Since 2000, some studies have found that air pollution is also associated with not only respiratory disease, but also cardiovascular mortality and morbidity. I believe that there are adverse health effects from air pollution other than those reflected in measure of morbidity and mortality. Health-related quality of life (HQOL) refers to how a person feels and functions in everyday life and to the effects of ill health. HQOL measurements, which were validated scientifically, enable us to measure a population's health status that cannot be measured by morbidity or mortality. As to the relation between air pollution and health, the American Thoracic Society has recognized that a decrease in HQOL is an adverse health effect of air pollution, and the society has revised guidelines of adverse health effects of air pollution in their revised statement in 2000. The society pointed out that evaluation of the adverse health effects of air pollution based on scores of the HQOL is important for policymakers to establish policies related to both individual health and public health concerns. However, only a few studies on the association between the concentration of ambient air pollution and HQOL has been reported, yet. In this meeting, I will present two Japanese studies: the study examined an association between intracerebral hemorrhage and hourly concentration of ambient air pollution, and the study examined an association between exposure to ambient air pollution and the vitality domain of the HQOL.

# Effects of different level of air particulates on respiratory functions in adults in Beijing

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In Beijing China, several positive pollution-abatement measures were executed along with the Olympics holding in 2008. This gave a chance to study the relationship between respiratory functions and air pollutants of different levels.

In present study, 41 residents (18 males, 23 females, and 50-72 years old) who live in urban area nearby the main traffic road were recruited. Their respiratory function monitor was repeated executed for about two weeks from May to June (before the Olympics), from August to September (during the Olympics) and from October to November (after the Olympics). As to say air pollutants, the API values published by Beijing Municipal Environmental Protection Bureau were collected. And the daily PM<sub>10</sub> mass concentrations were calculated from the average API value of the two nearest monitor stations. A mixed linear model used in the analysis.

As the results, the mass concentrations of PM<sub>10</sub> of each period were  $254 \pm 146 \mu\text{g}/\text{m}^3$ ,  $62 \pm 36 \mu\text{g}/\text{m}^3$ , and  $123 \pm 81 \mu\text{g}/\text{m}^3$ , respectively. The PEF values of males in the morning are  $459.6 \pm 128.0 \text{L}/\text{min}$ ,  $437.4 \pm 107.8 \text{L}/\text{min}$ , and  $411.8 \pm 131.9 \text{L}/\text{min}$ , respectively. While that of females are  $314.4 \pm 82.6 \text{L}/\text{min}$ ,  $323.7 \pm 61.4 \text{L}/\text{min}$  and  $327.9 \pm 64.2 \text{L}/\text{min}$ . A trend of negative correlation between respiratory functions and the increment for PM<sub>10</sub> could be found.

In conclusion, the air quality was improved greatly during the Olympics, and the possible influence of PM<sub>10</sub> on the healthy adults' respiratory functions should be further analyzed.

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## **Air pollution and preterm birth in Taiyuan, Shanxi, China between 2006 and 2007**

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**Objective:** To evaluate the effect of air pollution exposure during pregnancy on the occurrence of preterm birth in a highly air polluted city in China.

**Methods:** Case-Control and Case-Cross-Over design were used to examine the chronic and acute effect of four pollutants (PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>2</sub>, CO) in a cohort of 31,219 neonates born in the city area of Taiyuan, Shanxi, China. Air pollution data at 8 air quality monitoring stations were used to create exposure estimates for periods of pregnancy.

**Results:** For the first trimester, the odds of preterm birth increased with increasing PM<sub>10</sub> and NO<sub>2</sub> exposures (PM<sub>10</sub>:1.53-2.66; NO<sub>2</sub>:1.30-2.44) after controlling the effects of socioeconomic factors, prenatal care, seasonal effects, maternal characteristics and newborn gender. Women exposed to NO<sub>2</sub> during the last four weeks of pregnancy experienced increased odds of preterm birth (1.32-1.38). Also, the interactive effect of PM<sub>10</sub> and NO<sub>2</sub> was found in this study. Concerning the acute effect of air pollutant, the lag 2 days effect of PM<sub>10</sub> was found significantly associated with 7% increase of preterm birth.

**Key words:** Preterm birth; Air pollution; Acute and chronic effect

## **Air pollution and population health in China**

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Although China has achieved great progress in ambient pollution reduction in the past two decades, it is still one of the few countries with the worst air pollution levels in the world. Exposure to outdoor air pollution is being considered a major determinant of population health in China. Dozens of epidemiological studies on air pollution and mortality/morbidity have been conducted in China, using time-series, case-crossover, or cross-sectional designs. The increased health risks observed among Chinese population are similar in magnitude, per amount of pollution, to the risks found in other parts of the world. However, the importance of these increased risks is greater than in North America or Europe, because the air pollution in China is at much higher levels in general and Chinese population accounts for more than one fourth of the world's totals. There has been no air pollution cohort study currently available in China examining the long term effects of air pollution; also, no published Chinese data assessed the relation between air pollution and sub-clinical indicators. Future research in China should focus on the prospective analysis of association between air pollution and cardiopulmonary disease and the likely the underlying pathophysiologic link.

# **Effect of particulate air pollution on the respiratory health of college students**

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Numerous of reports have documented that elevated concentrations of airborne particulate matter (PM) are correlated with increasing in respiratory symptoms as well as decreasing lung function values on children in western countries. In China, many studies have examined the effects of PM with aerodynamic diameter less than  $10\mu\text{m}$  ( $\text{PM}_{10}$ ). However, the effect of  $\text{PM}_{2.5}$  (PM of aerodynamic diameter  $< 2.5\mu\text{m}$ ) on health adult is still unclear. To assess the exposure effect of  $\text{PM}_{2.5}$  on the respiratory health of adult, we will recruit a panel of 40 college students from two different campuses in Wuhan University, respectively. Both campuses locate in the central area of Wuhan city. One is nearby the main road, whereas the other one is not. We will collect daily data of respiratory symptoms and data of peak expiratory flow (PEF) /forced expiratory volume in 1 sec ( $\text{FEV}_1$ ) in the morning and evening. 24-hr average airborne  $\text{PM}_{10-2.5}$  (PM of aerodynamic diameter  $10-2.5\mu\text{m}$ ),  $\text{PM}_{2.5}$  concentrations are measured indoors and outdoors, and  $\text{PM}_{10}$ , nitrogen dioxide, sulfur dioxide concentrations are obtained from daily post of Wuhan Environmental Monitoring Center (WEMC) on the website. All of data will be collected not less than 2 weeks in each of four seasons per year for 2 years. By means of generalized estimating equations, we will analyze the relationship between respiratory health and concentrations of in/outdoor PM, in different areas and seasons. Comparing these results, we will also analyze the potential factors which affect adult respiratory health. Therefore, we can provide the guideline to assess the risk of adult respiratory health in Wuhan, China.

## **The levels of partial macroelements and microelements in whole blood in children in Haidian district in Beijing**

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Minerals are essential to human physiology. A lot of studies indicated that deficiencies of minerals could result in diseases, especially in children. Currently, the levels of calcium, magnesium, copper, zinc and iron in blood are commonly detected to reflect the condition of essential minerals. Moreover, because the interactions among the different minerals exist in the biotransportation and biotransformation processes, comprehensive prevention and control is one of the most important hot research topics. And the levels of minerals of children in the different regions vary due to diet and environmental exposures. To investigate the levels and the deficiencies of calcium, magnesium, copper, zinc and iron among pupils in Beijing, as well as to find the right way for prevention, we detected the levels of Ca, Mg, Zn, Cu, Fe in whole blood of children (including 8076 8-year-old and 7030 10-year-old children) in Beijing by atomic absorption spectrometry. Our results indicated that the deficiencies of Zn and Fe were relatively serious, and the condition on Fe deficiency is significantly different between boys and girls in the group of age 8. Besides, the levels of some minerals above have differences between boys and girls. And to ensure the health of children, the regular detection of essential minerals and the appropriate approach directed against different conditions are necessary.

**Keywords:** children; mineral; deficiency; comprehensive prevention and control

# **An ecological study of lung cancer mortality and severe air pollution in the 1960s in an industrial city in Japan**

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In Japan, lung cancer mortality has been consistently increasing since the 1950s. Some ecological studies reported that lung cancer mortality was higher in urban districts than in rural districts, and adverse effects of air pollution on lung cancer have been suggested. Amagasaki is an industrial city located in Western Japan. The levels of air pollutants, such as sulfur oxides and dust fall, in the city were extremely high from the later 1950s to the 1960s. Thereafter, various pollution control measures were taken in the 1970s, and the levels of both pollutants decreased considerably.

This study aimed at assessing the association between exposure to severe air pollution in the past and the subsequent transition in lung cancer mortality among persons who lived in an industrial city. Vital statistics from 1983 to 2006 and the data on air pollution measurements from 1960 to 1990 in Amagasaki City were used. Pearson correlation coefficients were calculated between the standardized mortality ratios (SMRs) for lung cancer and the air pollution levels in 6 wards of Amagasaki City. The associations between changes in air pollution levels and the annual SMRs were also evaluated in the light of a potential latency period. The levels of air pollution were extremely high in the 1960s, and they decreased since 1970. The SMRs for lung cancer in 1989-1993 among females for 6 wards were significantly associated with the amounts of both sulfur oxides and dust fall in the past for each ward. The positive associations were observed between the annual SMRs among females and the amounts of both pollutants when the lag time of 20-30 years was taken into account.

These results suggest that severe air pollution in the 1960s in an industrial city affected the subsequent increase in lung cancer mortality. In many industrial cities, the levels of air pollution had been high in the past. Since lung cancer might occur several decades after exposure to risk factors, the effects of air pollution should be evaluated over a long period after the levels have decreased.

**Keywords:** air pollution; sulfur oxides; lung cancer; standardized mortality ratio