

## Beijing Forum 2019 Environmental Health —A Joint Event of AGU Centennial and MAIRS (II)

On the afternoon of November 2nd, the second session was hosted at Dong Xu Conference Hall, School of Economics, PKU. The speakers focused on the topic of air pollution and its health effects and had an in-depth discussion on this point.

Professor Frank Kelly, from the School of Biomedical Sciences, King's College London, gave a lecture titled "London, England: A Test Bed for Traffic Management Schemes to Improve Air Quality". Kelly developed the London Air network to help people understand air pollution and reveal what policy making should focus on. Kelly then introduced three traffic pollution control policies in London. Through a Congestion Charging Scheme, it was found that charging congestion fees will not reduce pollution but instead, more congestion. Measures to establish Low Emission Zones could gradually reduce emissions and improve air quality; Setting up the London Ultra Emission Zone to charge for different vehicles was a good idea but it was difficult to publicize.

Associate professor Shang Jing, from the College of Environmental Sciences and Engineering, Peking University, shared her research on "Physicochemical Characteristics and Oxidative Potential of Black Carbon Particles before and after Ozone Treatment". China has had a large black carbon emission problem for a long time. Shang used DTT, XPS, EPR and other methods to analyze and establish a chamber system to study the aging characteristics of black carbon after exposure to ozone. It was found that ozone treatment can alter the physicochemical properties of BC particles and make its OPD<sub>TT</sub> higher and further affect health effects.

Professor Deng Qihong from the School of Energy Sciences and Engineering, Central South University, gave a speech titled "The Role of Air Pollution in the Fetal Origins of Childhood Diseases". He was the first to establish a core body temperature curve to study the health effects of indoor heat exposure. Another study found that exposure to particulate matter in the respiratory system differs from exposure to health effects in children and adults, as does exercise intensity. Indoor pollution is also a risk factor for allergies and infections in children. Finally, Deng put forward four suggestions on urban construction planning.

Associate professor Qiu Xinghua, from the College of Environmental Sciences and Engineering, Peking University, gave a lecture titled “Screening of Hydrophobic Organic Components of Ambient Fine Particulate Matter (PM<sub>2.5</sub>) Associated with Cellular Response of Inflammation”. Different components of PM<sub>2.5</sub> have different health effects but the sources and composition of PM<sub>2.5</sub> are complex. Qiu set up the OMICS method to obtain the biological effects of PM composition and source. The experiment yielded a lot of data and identified substances with cytokines. The method can help identify new toxic species and analyze the contribution of single species in complex mixtures.

Prof. Tong Zhu, dean of the College of Environmental Sciences and Engineering at Peking University, gave the speech titled “Susceptibility of Individuals to the Health Effects of Air Pollution”. The Exposure-Response models still have large variance and risk assessment remains high uncertainty. The susceptibility of different populations is a possible reason for this. Zhu's group used a panel study based on individuals to reveal this potential mechanism. Through three case-control panel studies on prediabetes, CVD and COPD, it was found that there were significant differences in the levels of cytokines and other biomarkers in healthy and diseased populations after exposure to air pollution.

Professor Xu Shunqing, from the School of Public Health, Huazhong University of Science and Technology, gave a speech titled “Effects of Pollutants on Vulnerable Populations”. The study of environmental health should be based on the study of dose-response relationship. Xu's team set up a birth cohort in Wuhan to study the benchmark. Through the study of the benchmark of vanadium in drinking water, relevant policy recommendations were put forward to the government. Human evidence, susceptible subjects and sensitive endpoint matter most in setting benchmarks.

Professor Tang Deliang, from Mailman School of Public Health, Columbia University, presented on the topic “Molecular Epidemiology—An Innovative Tool in Environmental Health Study”. Molecular epidemiology is an effective means to study the mechanism black box between risk factors and diseases, and biomarkers are indicators of exposure. PAH-DNA adducts can be used as biomarkers for PAH exposure. Then he introduced a nested case-control study of lung cancer collecting blood for retrospective analysis of biomarkers and compared the advantages and disadvantages of several epidemiological research methods.

Assistant Professor Gong Jicheng, from the College of Environmental Sciences and Engineering, Peking University, gave a speech titled “An Investigation on the Mechanisms Via which Air Pollution Exposure Affects Human Health through Intervention Studies”. To investigate the unclear biological mechanism of the effects of ozone exposure on human health, Gong designed an intervention study that measured biomarker concentrations to explore associations with ozone by establishing exposure groups with different concentrations of PM<sub>2.5</sub> and ozone. To further elucidate the biological mechanism of ozone exposure, he will conduct further study on immunity and inflammation by measuring 10 inflammatory cytokines and examine whether ozone exposure affect amino acid metabolism and urea cycle.

Professor Michael Brauer, from the School of Population and Public Health, The University of British Columbia, delivered a speech titled “Columbia Source Contributions to Air Pollution and the Burden of Disease in China”. Brauer suggested that satellite and ground monitoring could be combined to estimate PM<sub>2.5</sub> exposure. But because air pollution is a dynamic process, modeling needs to be done constantly. China's air pollution exposure has decreased since 2012, but the death rate has increased due to an increase in disease prevalence caused by air pollution. Finally, he introduced the CEDS platform which can capture emissions from road traffic and production on a global scale.

Professor Gabriel M. Filippelli, from the Department of Earth Sciences, Indiana University-Purdue University, gave a speech titled “New Approaches to Identifying and Reducing the Global Burden of Disease from Pollution”. Filippelli proposed using public resources through "Citizen Scientists" to collect soil and dust samples. Filippelli set up a website and the data can be daily updated. A global cohort was developed to increase the monitoring of indoor pollutants other than dust. Hyperspectral method is used to predict the concentration of heavy metals by their reflectivity.

Assistant Professor Xue Tao, from the School of Public Health, Peking University, gave a speech titled “Global Loss of Infants and Air Pollution”. To achieve SDG 3.2, additional efforts are required to prevent infant deaths and pregnancy losses. Clear air actions can be a new strategy to reduce the global loss of infants. The air-pollution-attributed infant deaths might have been underestimated. It is time to establish an exposure-response function between air pollution and pregnancy loss and apply to health impact assessment.