PKU Research Team Publishes Papers on Inhalation Exposure to Pollutant and Cancer Risk

A research team from the College of Urban and Environmental Sciences of Peking University published papers on the analysis of a pollutant in China that brings cancer risks on Dec 14.

One of the research findings of the "Tao Shu Team," led by PKU Professor Tao Shu, is recently published in *Proceedings of the National Academy of Sciences* (*PNAS*), entitled "Inhalation exposure to ambient polycyclic aromatic hydrocarbons and lung cancer risk of Chinese population". It is one of the accomplishments of the team on the emission, transportation and exposure risks of the hydrocarbons, under financial support from National Natural Science Foundation and "Major Project of Chinese National Programs for Fundamental Research and Development" (973 Program) of the Ministry of Science and Technology of China.

Polycyclic aromatic hydrocarbons (PAHs) are included in the Convention on Long-Range Transboundary Air Pollution Protocol on Persistent Organic Pollutants, and the cancerogen is among the most toxic organic pollutants of concern in China.

The team, using the CanMETOP (Canadian Model for Environmental Transport of Organochlorine Pesticides) model based on a high-resolution emission inventory and meteorological data, predicts the atmospheric transport of PAHs for the reference year of 2003.

The model framework applied in research is a combination of three models including an atmospheric transport model, a population exposure model and a lung cancer risk assessment model.

The uncertainty and variability of the predicted exposure risk are evaluated through the analysis of the rectified calculations.

Because of the population and energy structure, China's PAH emission is more intensive than that of developed countries. Open straw burning, biomass burning and small-scale coke production are main sources of PAH pollution in the environment, while the traffic gas combustion accounts for the major one in urban areas, according to the research.

Although the spatial variability is high, lung cancer risk in eastern China is higher than in western inland regions, and populations in major cities have a higher risk of lung cancer than rural areas.

The scaling effect in the atmospheric transport model is rectified by interpolating the calculated concentrations based on the emission inventory. The research also builds the genetic susceptibility for lung cancer risk, which is associated with the polymorphism of genes related to metabolism of carcinogens and DNA repair. Based on these relationships, the variability in respiration rate and susceptibility is taken into account in a population-level exposure risk assessment.

The trend of China's PAH emission is analyzed with potential controlling strategies. Major measures to control the PAH emission and to reduce the exposure risk include the closure of small-scale coke ovens according to the law, the promotion of natural gas stoves and centralized heating facilities, and improvement of rural biomass burning stoves in efficiency.

Other achievements of the research team have been published in journals including *PNAS*, *ES&T* and *AE*.