1.086 Physicochemical and bioreactive characterization of urban fine particulate matter during Asian dust storm .

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Abstract:

The objective of this study is to investigate the physicochemistry and bioreactivity of fine particles ($PM_{2.5}$) during the Asian dust storm period. The $PM_{2.5}$ samples were collected in Xi'an and Beijing from 9th March to 7th April. $PM_{2.5}$ were collected by mini-volume air samplers. Anions (Cl^-, NO_3^- and SO_4^{2-}), cations (NH_4^+, K^+, Mg^{2+} and Ca^{2+}), organic carbon (OC) and elemental carbon (EC) were determined. Human aloveolar epithelial A549 cells were exposed to the $PM_{2.5}$ at 50 μg/ml for determination of cell viability. The average $PM_{2.5}$ concentration were 104.2 $\mu g \cdot m^{-3}$ and 85.7 $\mu g \cdot m^{-3}$ in Xi'an and Beijing, respectively. During the study period, Xi'an and Beijing were suffered with heavy pollution with $PM_{2.5}$ concentration emitted from anthropogenic emissions as well as dust storm. It was found that OC contributed more to $PM_{2.5}$ in Beijing, and the OC/EC ratio of Beijing was higher than Xi'an. The concentrations and contributions of NO_3^-, SO_4^{2-} and NH_4^+ in Xi'an were much higher than Beijing, which was mainly caused by the local emissions of fossil fuels combustion with photo-oxidation. It was also found that the contribution of NO_3^- was increased evidently in pollution days due to the combustion activities, while in dust storm period, NO_3^- and NH_4^+ contributions to $PM_{2.5}$ showed evident decrease trend. We observed that the cell viability was positively correlated with Mg^{2+}, Ca^{2+}, OC and EC ($p<0.05$) in the Xi'an $PM_{2.5}$ samples, whereas cell viability was

positively correlated with Cl-, K+, Mg^{2+}, OC and EC ($p<0.05$) in the Beijing $PM_{2.5}$ samples. The difference in bioreactivity induced by the $PM_{2.5}$ could be resulted from the various emission sources during the dust storm period.