1.026 Cyclone collection of fine and coarse particles followed by exposure experiments.

Early Career Scientist

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Abstract:

Exposure to atmospheric aerosols is a serious concern for human health. However, detailed mechanisms of the cellular biochemical reactions associated with the toxicity of aerosol particles have not been elucidated well so far. Generally, cell exposure studies for aerosol particles have been conducted using particulate matter collected by vibrating aerosol-loaded filters. However, the particles used for the exposure study may not be the same as those present in ambient air. Possible contamination from the filter material should also be considered. In addition, sample handling to obtain particles for exposure experiments is highly complicated and time-consuming. Besides, the amount of particles that are collected on a filter is often insufficient to perform an exposure studies. Hence, the development of techniques that allow researchers to collect a sufficient amount of aerosol particles for exposure studies without the use of filters is needed. In this study, we developed a high-volume simultaneous sampler for fine (PM2.5) and coarse aerosol particles using the impactor and cyclone techniques. Approximately 100 mg of fine and coarse aerosol particles can be collected individually as powder form for 2-3 week sampling. The sampling device developed in this study allows researchers to collect a sufficient amount of aerosol particles for cell exposure studies without the use of filters. We collected fine and coarse aerosol particles in three cities (Yokohama, Saitama, and Fukuoka) in Japan under the CYCLEX (Cyclone collection of PM2.5 followed by Exposure

Experiments) project. Chemical analysis (about water soluble ion, metal, Carbon) of the collected particles has been carried out followed by cellular exposure experiment. We found particle size- and sampling location-dependent response in the results of exposure experiments. Therefore, in cellular exposure experiment, the results of PM2.5 collected by the new method (virtual impactor and cyclone) differ from that a conventional method (real impactor and filter).