ABSTRACT (250 max)

In-vitro assays of biological activity induced by particulate matter (PM) are a tool for investigating mechanisms of PM health effects. They have potential application to exposure assessment in chronic disease epidemiology. However, there has been little reporting of the impact of real-world PM collection techniques on assay results. Therefore, we examined the effect of sampling duration and post-sampling delays in freezing on PM-induced biological activity. Duplicate samples of respirable ambient Los Angeles PM were collected on polyurethane foam filters during 17 days and during three contemporaneous consecutive shorter periods. After collection, one duplicate was stored at ambient temperature for 24 hours before freezing; the other was frozen immediately. Cytokine response (IL-1beta, IL-6, IL-8 and TNFα) to PM aqueous extract was assessed in THP-1 cells, a model for evaluating monocyte/macrophage lineage cell responses. There was consistent 3-4 fold variation in PM-induced cytokine levels across the 3 collection intervals. Compared with levels induced by PM pooled across the 3 periods, continuously collected PM-induced levels were reduced by 25% (IL-6) to 39% (IL-8). The pattern of cytokine gene expression response was similar. Cytokine level variation by time to freezing was not statistically significant. PM-induced inflammatory response varied substantially over a weekly time scale. We conclude that long PM sampling interval induced less activity than the average of equivalent shorter consecutive sampling intervals. Time to freezing was less important. Implications for development of metrics of long-term spatial variation in biological exposure metrics for study of chronic disease merit further investigation.

Key words: Air pollution, toxicology, exposure assessment, epidemiology