

# 医薬品製造施設を想定した室内環境における微小粒子の滞留と換気による除去

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Suspension of Fine Particles in Air and their Removal by Ventilation in an Indoor Environment as a Model of a Pharmaceutical Manufacturing Facility

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## Summary

To understand the distribution of bacteria in an indoor environment and their removal by ventilation, the relationship between particle dynamics and particle size was investigated using soil particles as a model. A planter filled with crushed soil was placed in a chamber and air was blown over the soil surface for 2 minutes, then the chamber was left undisturbed for 60 minutes, and finally ventilated for 30 minutes. The behaviour of fine particles was continuously monitored with an optical particle counter that provided data on particle size and number. The number of suspended particles in 6 size categories (0.5~2, 2~5, 5~10, 10~20, 20~30, > 30 $\mu$ m) was continuously monitored in the chamber environment. Immediately after blowing air at 5 m/s, dust of all particle sizes in the range of 0.5~30 $\mu$ m and coarser was generated. The number of particles larger than 5 $\mu$ m decreased rapidly after cessation of air-blowing, and the rate of decrease increased with particle size. However, particles of 5 $\mu$ m and smaller remained suspended for a long time. More than 99 % of the particles counted during suspension were smaller than 5 $\mu$ m, and most of them were between 0.5 and 2 $\mu$ m. The number of these particles decreased during ventilation. Air quality in a pharmaceutical manufacturing environment is specified in terms of the number of particles of 0.5 to less than 5 $\mu$ m and the number of particles of 5 $\mu$ m or more. Our results suggest that real-time monitoring of potential microbial contamination should be possible by using a particle counter that can provide particle size information, based on the relationship between the number of fine particles and the particle size distribution.

## Key words

Indoor environment, Particle counter, Bacteria, Fine particle, Aerosol