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# **Infant Exposure to Resuspended Particles from Carpeted Flooring: Experimental Chamber Study with a Simplified Mechanical Crawling Infant**

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## **ABSTRACT**

Airborne particles of biological origin – bioaerosols – are present everywhere, including the indoor environment where people spend considerable amounts of time, and exposure to such materials via inhalation can have a number of health implications. Bioaerosol dynamics can occur through a variety of mechanisms, among them resuspension of deposited particles due to human activity. Because the breathing zone of infants is at a much lower height than that of adults, there is reason to suspect that infants are exposed to greater concentrations of bioaerosols resuspended from the floor, though knowledge in this specific area is limited. To investigate, a mechanical infant was used to simulate crawling over carpeting and particle concentrations for varying size groups were recorded using an optical particle sizer (OPS) at heights corresponding to both infant and adult breathing zones. In addition, resuspension tests on the infant breathing zone were repeated following vacuuming of the carpets to observe the effect of vacuuming on exposure rates. Results show that, as a result of infant crawling, concentrations of resuspended particles are significantly higher in the infant breathing zone compared to the bulk air, which is reduced but not quite eliminated by vacuuming. In addition, the mechanisms governing particle concentrations in the breathing zone appears to differ from those of the bulk environment. This study demonstrates that infant crawling causes significant resuspension of particles in the infant breathing zone, making it a prominent contributor to infant bioaerosol exposure worthy of further investigation.

## **KEYWORDS**

bioaerosols, resuspension, human exposure