

## Bulletin de veille émissions d'aérosols par l'appareil respiratoire humain N° 28 – Mars 2026

**Objectifs** : veille scientifique sur les émissions d'aérosols (gaz et particules) par l'appareil respiratoire humain (nez/bouche).

*La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS. Les éléments issus de cette veille sont fournis sans garantie d'exhaustivité.*

*Les liens mentionnés dans le bulletin donnent accès aux documents sous réserve d'un abonnement à la ressource.*

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Li YL, Huang HH, Han QY, Li CY, Tang HD, editors.

### **Biotracer Study on the Spatial Dispersion of Full-Size Droplets Exhaled by Coughing.**

9th International Conference on Energy and Environmental Science-ICEES-Annual; 2025 Mar 20-22

2025; Chongqing, PEOPLES R CHINA: Springer International Publishing Ag.

[https://link.springer.com/chapter/10.1007/978-3-032-01036-0\\_32](https://link.springer.com/chapter/10.1007/978-3-032-01036-0_32)

*In this study, we established a lactobacillus biotracer system combined with a high-resolution array of culture dishes (20 cm spacing) to quantitatively characterize the three-dimensional spatial distribution of pathogen-laden droplets exhaled during human coughing. Utilizing Lactobacillus bulgaricus as a non-pathogenic surrogate tracer, we systematically analyzed bacterial droplet transmission patterns through a fan-shaped MRS agar dish array in a static closed environment. Our results show that when the mask is not worn, the exhaled droplets exhibit significant segmenting attenuation characteristics: Within the critical distance of 0-1.5 m, large bacterial-containing droplets (> 50  $\mu$ m) exhibited exponential attenuation governed by gravitational sedimentation. Beyond this threshold, droplet nuclei aerosols (< 5  $\mu$ m) transitioned to power-law attenuation dominated by turbulent diffusion. Medical masks demonstrated > 90% interception efficiency for short-range transmission ( $r < 1.5$  m), but showed limited suppression of farfield aerosol dispersion, highlighting the necessity for combined N-95 respirators and ventilation to achieve multi-level protection. This research innovatively developed a piecewise regression model integrating exponential and power-law attenuation dynamics, providing the first biological evidence for the mechanistic transition between droplet and aerosol transmission. The identified critical distance ( $r(c) = 1.5$  m) establishes crucial spatial parameters and theoretical foundations for optimizing multi-tiered infection control strategies in healthcare settings.*

Liu MQ, Liu XY, Jiang XH, Quan LQ, Zhang RY, Lu XH, et al.

**Real-time direct measurement of indoor respiratory aerosols.**

Build Environ. 2026;287:9.

<https://www.sciencedirect.com/science/article/abs/pii/S0360132325013617?via%3Dihub>

*Respiratory aerosols play a critical role in the airborne transmission of infectious respiratory diseases. Understanding the concentration of respiratory aerosols in indoor environments is a key for assessing the transmission risks of these diseases. Due to their extremely low number concentration, no method currently exists to distinguish and count respiratory aerosols when they are mixing with other indoor aerosols that are at least 1,000 times more abundant. Conventional approaches, such as computational fluid dynamics models and CO<sub>2</sub> monitoring, while useful for estimating respiratory aerosol concentrations, have significant limitations as indirect methods. Here we introduce an online technique to directly detect and quantify respiratory aerosol concentrations based on single particle aerosol mass spectrometry (SPAMS) measurement. We discovered distinct SPAMS ion tracers (e.g., NaClCN<sup>-</sup> and NaClCNO<sup>-</sup>) specific to respiratory aerosols and validated their effectiveness in identifying respiratory aerosols from other indoor aerosol types. Applied in a real-world meeting, the method revealed rapid increases in respiratory aerosols during vocalization and their decline after occupancy. These results indicate that direct, real-time measurement of respiratory aerosols can add more specific evidence for assessing airborne transmission risk in indoor environments.*

Nikuri P, Matvejeff AT, Geneid A, Kinnari T, Sanmark E, Maalouf A, et al.

**Respiratory Particle Emissions in Tracheostomized Outpatients: Comparable to Healthy Volunteers.**

Laryngoscope Investig Otol. 2026;11(2):7.

<https://doi.org/10.1002/lio2.70369>

*Objective(s): Humans continuously emit respiratory particles during routine activities (breathing, speaking, coughing), and these can carry pathogens. Particle size and site of origin determine suspension time, deposition, and transmission risk. Tracheostomy makes the airflow bypass the upper airway partly or in full. Its effect on aerosol generation is unclear; therefore, we compared emissions between tracheostomized and healthy volunteers during tidal breathing, deep breathing, speaking, and coughing, and examined differences across activities within the tracheostomized group. Methods: Aerosol emissions of 10 tracheostomized, uninfected volunteers and 16 healthy volunteers were measured with a portable aerosol spectrometer. Tracheostomized participants were measured with and without a heat moisture exchanger. A Mann-Whitney U-test was used to compare aerosol emissions between tracheostomized participants and healthy controls. Wilcoxon signed-rank test was used to compare paired measurements within the same individuals in the tracheostomized group. Results: Tracheostomy, whether occluded or not occluded, does not produce significantly more aerosol than healthy participants. Most detected particles were < 1  $\mu$  m (approximate to 90% of measurements), with medium particles approximate to 50% and large particles uncommon. Conclusion: In stable outpatients, aerosol emissions did not differ between the three groups across common respiratory activities, suggesting the exhalation route is not a major determinant of emission under these conditions. The impact of tracheostomy care procedures, such as suctioning, was not evaluated in this study. Level of Evidence: 2.*