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**Title:**

**Potential Use of Personal Ionizers to Reduce Occupational Exposure**

**Abstract**

**Background:** Airborne particulate matter (PM), especially fine and ultrafine particles, continues to pose health risks in many workplace environments. While traditional controls like ventilation and personal protective equipment (PPE) is essential, they may fall short in enclosed or low-airflow settings. This study evaluated four commercially available wearable air ionizers, AirTamer, Twinkle, Air Supply, and Timage, to explore their effectiveness as supplemental tools for reducing particle exposure.

**Methods:**

Experiments were conducted in both small and large controlled chambers to simulate real-world conditions. The AirTamer consistently showed the strongest performance, cleaned 99.9% particles in 4 minutes, with a particle decay rate of 2.80% per second and a steady-state suppression rate of about 10%. In contrast, the other devices delivered minimal or no improvement, and some failed to perform anywhere near their manufacturer-stated ion outputs.

**Results:**

Ion emission levels varied widely among the devices, and in several cases, fluctuated more than the average, indicating unstable ion generation. These inconsistencies likely played a role in their poor performance. Even the best-performing ionizer achieved only around a 10% reduction in particle levels, well below the commonly recommended 80% suppression threshold. Overall, the findings suggest that while high-output ionizers like the AirTamer can help lower airborne particle concentrations in controlled environments, wearable ionizers should be seen as limited, short-range tools. They are not a substitute for primary exposure controls like ventilation or filtration systems.

**Conclusion:**

Future research should focus on improving ionizer design, stabilizing performance, and establishing standardized testing methods to help employers and users make informed choice