Nasal calcium rich salts show reduction of exhaled aerosol particles up to 99%

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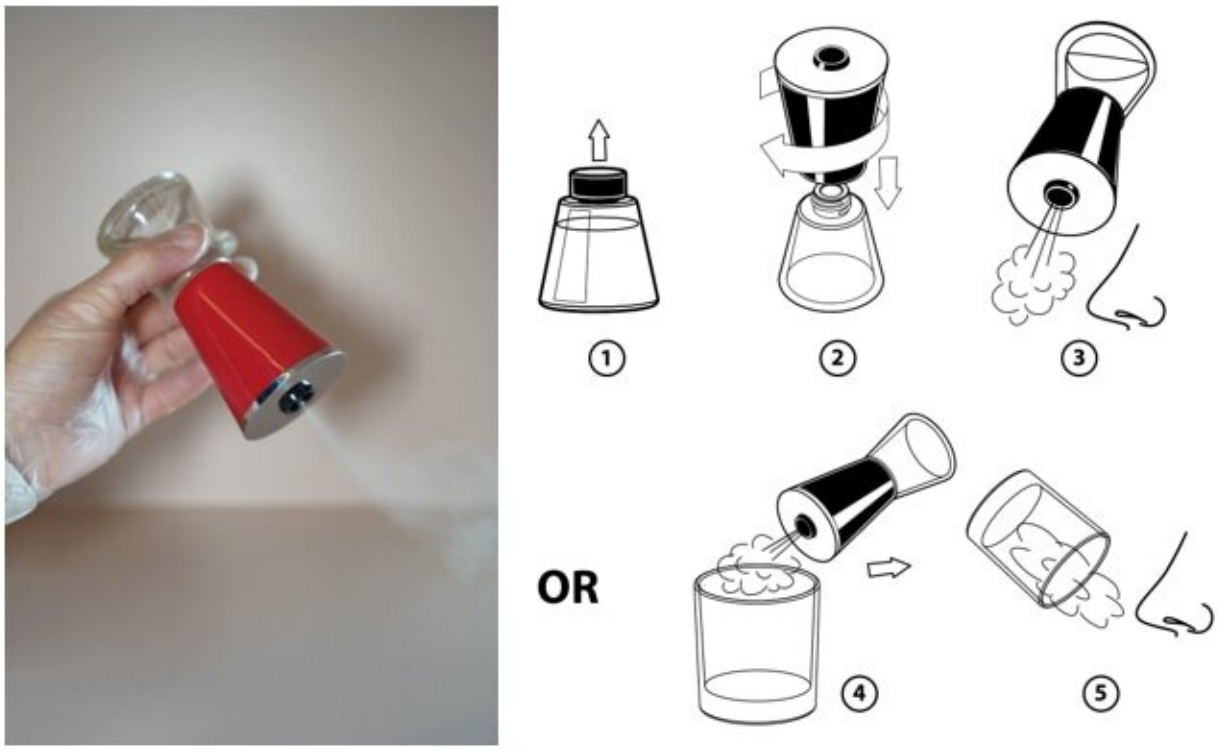

FEND is available from October 5 at hellofend.com. Credit: World Scientific Publishing

In a paper published in *Molecular Frontiers Journal*, researchers from Cambridge, Massachusetts have discovered a more effective way of eliminating airborne particles from airways using nasal calcium-rich salts called FEND, which have potential applications in the fight against

COVID-19.

Sensory Cloud, creators of FEND and a Boston-based technology startup that designs solutions to problems of human wellbeing and healthcare through pioneering discoveries at the frontiers of olfaction and respiratory biology, studied the effectiveness of nasal administration of physiological salts at reducing airborne particles from exhaled breath including the sub-micron aerosolized particles that are ineffectively filtered by cloth face masks. Lead authors of the paper are Dr. David Edwards (John A. Paulson School of Engineering, Harvard University) and Dr. Robert Langer (Department of Chemical Engineering, MIT),

Ninety-two men, women and children were observed in three separate studies showcasing the use of FEND in various situations: in the workplace, quarantining at home, and in comparison to cloth face masks. The studies assessed how FEND, a drug-free calcium-enriched nasal salt, would interact with airway lining mucus to cleanse the airways of bioaerosols. The results showed a reduction of exhaled aerosol particles of up to 99%, with an overall reduction of exhaled particles in the largest cohort of human subjects (76 workers) of around 75%.

"The findings, which build on an earlier study this summer, suggest that we can provide what is, in effect, a nasal filter to protect at-risk populations from viral carrying aerosols," said Sensory Cloud founder Edwards. "Access to a new hygiene protocol for reducing the spread of these smallest particles, which can otherwise be dispersed into indoor air and enter deep into our lungs, can be an important intervention as we head back to work and school, as winter approaches, and as troubling data about rates of infection continue to emerge."

In the first study, 76 COVID-negative volunteers (including 74 workers and two children) from No Evil Foods in Asheville, NC, ages 15-66, were recruited. Prior to the nasal hygiene intervention, exhaled aerosol

from the 76 workers followed a classical "super spreading" distribution, with 20% of participants accounting for 80% of the overall exhaled aerosol. Within the "super spreader" group, half of the individuals (or the top 10% of exhaled particle producers) were found to be responsible for 80% of the super spreader production—or 64% of the overall production.

The 76 volunteers then received FEND, a drug-free nasal saline hygiene formulation comprised of calcium chloride and sodium chloride in distilled water and administered via a mist of 9-10 micron diameter droplets by a hand-held mister. The FEND intervention suppressed 84% of exhaled aerosols for the highest producing super-spreaders and 78% overall for all super-spreaders. Overall, exhaled aerosols among all participants did not change after a nasal saline control intervention, Simply Saline from Arm & Hammer, a nasal spray of isotonic sodium chloride.

"Health and safety is a huge priority at No Evil Foods," said Sadrah Schadel, co-founder and Chief Creative Officer of No Evil Foods. "Having the chance to actually see FEND work, clearing particles from our exhaled breath, was an overwhelmingly positive experience for our team."

The second study evaluated the exhaled aerosols of a volunteer family of four in quarantine with one COVID-positive mother. The study followed the family for five days starting at eight days post-symptoms for the mother. The mother's exhaled aerosols showed extremely high output on days eight and nine. After receiving the FEND intervention, her levels decreased to average baseline levels for a COVID-negative patient, with suppression lasting several hours following the intervention.

The final study compared the use of FEND to surgical mask use in 12 children and adults. The surgical masks reduced overall exhaled particles

by around 34% for the group, while FEND reduced overall exhaled particles by 46%—with one individual showing no statistical difference on using the mask or FEND, possibly for failure to administer properly. Excluding the outlier subject, exhaled aerosols were reduced by 59% when wearing masks and 87% following the FEND intervention. The differential benefit of FEND was due to its more effective reduction in sub-micron aerosol particles, given that most exhaled aerosol particles for all individuals are sub-micron.

The paper concludes that FEND can be an important addition to current COVID-19 hygiene protocols of mask wearing, hand washing, and social distancing. FEND adds to the efficacy of masks at reducing the penetration of respiratory droplets into the lungs or back into the environment and provides an added layer of defense for when mask wearing is not a possibility.

"We continue to support human volunteer studies in the U.S. and overseas, exploring unique hygiene protocols for collaborative teams, and deepening our understanding of nasal salt hygiene among those infected with COVID-19," said Edwards. "As FEND comes to market in coming weeks, we will prioritize distribution to healthcare professionals, and other essential workers in the U.S. and in countries around the world that are hardest hit by the COVID-19 pandemic. As we scale up production, we hope also to be helpful to clearing the air for children and teachers in public schools around the world."

More information: David Edwards et al, Nasal Calcium-Rich Salts for Cleaning Airborne Particles from the Airways of Essential Workers, Students, and a Family in Quarantine, *Molecular Frontiers Journal* (2020). DOI: 10.1142/S2529732520400040