

# Make indoors virus free

## Containment of COVID-19 pandemic through indoor air disinfection. Presentation of the aerosol based oji protection method

oji Europe GmbH (Nauen, Germany) asked TOTO Consulting LLC (San Jose, CA) to assess their new aerosol-based indoor air protection system. The analysis reviews oji's method in the context of established protection systems and evaluates the medical and operational capabilities as a complementary building block in the fight for a swift containment of the global COVID-19 pandemic.

### THE OJI-METHOD

The oji-method is based on the effective deactivation of coronaviruses present in any room's atmosphere while people may actually be present. Deactivation is achieved by reaction with virus-carrying aerosol particles or directly with viruses on contaminated surfaces.

The chemical agent is hypochlorous acid (HOCl), which is aerosolized in the room air being kept at safe and indiscernible levels. Actually the dosage used in the oji-method stays by a factor of 4 well below the legally permitted limits. At this level HOCl is effective, yet harmless and even with long-term exposure totally safe.

The coronavirus is very vulnerable to the HOCl. Both viruses in aerosol particles and those on surfaces are rapidly deactivated by destruction of their lipid envelope. Thus, in addition to disinfecting the room air, indoor's surface disinfection is achieved in parallel, which eliminates the risk from concealed smear infection (e.g.: from handles or faucets).

The sustained, yet safe level of an HOCl laden atmosphere protects all persons in the room. A positive side effect of the airborne HOCl is the deactivation of all other organic particles, suspended in the room air. Spores and bacteria are also eliminated from the air, which particularly helps allergy sufferers and people with asthma.

HOCl has been used in various forms for more than 100 years for disinfection in the healthcare arena. Applications range from room surface disinfection, wound and dental care, to entire room atmosphere disinfection. According to the FDA (Food & Drug Administration, USA), HOCl in its pure and stable form is considered the best, safest and most effective of available disinfectants that can be used in and on humans.

### AEROSOLS - UNDERESTIMATED RISK

Comparing to direct- and smear-infection, virus-laden aerosols are underestimated in their infection threat. With particle sizes below 2µm, these aerosols remain air-borne practically perpetually and represent a permanent indoor infection risk.

Conventional hygiene masks offer virtually no protection from aerosol particles because of their insufficient filtering capacity and unrestricted airflow.

Aerosols may be the main yet unrecognized carrier of the pandemics progression.

Therefore, indoor air disinfection procedures may be the crucial module in the containment of the Covid-19 pandemic. The oji-method can serve in tandem with established air improvement procedures like intensive ventilation and efficient HEPA air filtering.



### CONVENTIONAL PROTECTION METHODS

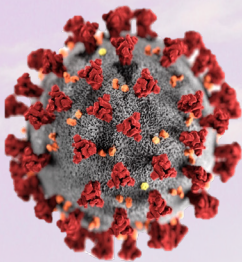
There are four principle protective measures against a Covid-19 infection: Social distancing, hygiene procedures, masks, and indoor air cleaning; the latter is pursued today with simple filtering.

In principle, social distancing only helps against the risk of transmission by large droplets ( $\varnothing > 300\mu\text{m}$ ), stemming from heavy breathing when singing, coughing or sneezing.



Indoors, social distancing has only a secondary role in the Covid progression. Indoors is 'aerosol country' with particle diameters mostly well below 10µm. Regular Hygiene masks are incapable of filtering these tiny virus-laden aerosol particles. Even FFP2 masks are of limited use due most often improper usage and air leakage across their skin/mask borders.

Studies in Hong Kong demonstrated the limited protection value of hygiene masks. During their 2nd pandemic wave no reduction in the pandemic incidence could be attributed to the highly compliant (>95%) wearing of hygiene masks.



Today's last line of defense is the use of high-quality HEPA room air filtration systems. They provide good protection against virus-laden aerosols, but even as mobile units they are relatively costly and as stationary units they are often difficult to install and maintain.

## CONCLUSION

- The COVID-19 pandemic will unfortunately remain with us - probably for years to come as vaccination cannot sufficiently contain the pandemic.
- Limited availability of vaccines, even resistance against vaccination, and the recently observed mutation tendency of the Sars-CoV-2 viruses sets practical and health policy limits.
- To regain a halfway normal public life, the use of additional methods for infection control is mandatory.
- The oji-method offers an attractive possibility to control infections on all four major infection routes. It is safe, effective, efficient, inexpensive and easy to use.
- In tandem with a significantly expanded and improved digital tracking of infected persons (à la South Korea), the uncompromised use of the oji-method allows to systematically yet differentially narrow down the infection chains.
- Room air disinfection with the oji-method can close a dangerous gap and provide valuable help as a supplement to existing protective measures.
- Many of the social and cultural restrictions propagated and enforced up to now could become obsolete when establishing the new oji-method.

	Conventional Protective Measures				oji
	Keep Distance (> 1.5m)	Hygiene Masks	FFP2/3 Masks	HEPA H14 Air filtration	HOCl Aerosol
<b>Droplets</b> [>100µm]					
<b>Aerosol</b> [<100µm]					
<b>Direct Contact</b>					
<b>Smear infection</b>					

Relative impact of the 4 Infection Pathways ▲

Relative protection of oji compared to conventional measures  
[Button size proportional to protection potential]