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UNDERSTANDING BIPOLAR IONIZATION IN A COVID-19 ENVIRONMENT

ASK THE EXPERTS

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Bipolar Ionization has been claimed to potentially mitigate, or reduce, the spread of bacteria and viruses throughout a space. Bipolar Ionization works by introducing positive and negative ions into the air. The ionization causes production of clusters of hydroxyl (OH) radicals, which are formed on the surface of microbes, removing hydrogen from the microbes' cell walls, thereby inactivating potentially infectious particles. If not properly specified and installed, it may cause negative health effects.

Q Do you have any experience with in-space installations (wall-mounted, etc.) or portable units that rely on passive diffusion of produced ions? Akin to a portable air filtering purifier?

DR. BAHNFLETH: There are/have been many portable ion generators. Most are consumer products of questionable quality control and performance. There may be better offerings from manufacturers who also do air handling unit installations.

There are several stronger filtration options for mitigating the spread of bacteria and viruses like the one that causes COVID-19.

MERV 13 OR BETTER IS RECOMMENDED AS EFFECTIVE FILTRATION IN OFFICES

While higher level filtration is technically more effect, we recommend MERV-13 filters as a good, cost-effective option for mitigating the spread. Other filters, particularly HEPA filters, are more effective, but are not easily adaptable to most commercial installations.

BIPOLAR IONIZATION SYSTEMS

When integrated directly into the HVAC system, Bipolar Ionization units are claimed to mitigate bacterial and viral spread.

Q Are microbes (bacteria and viruses) that interact with ions and fall to surfaces like desks or conference tables still active (harmful) or inactive?

DR. KAISER: The ability to "kill" harmful microbes by ionization differs for different microbes. Even in the most effective system, microbes are usually decreased in the air by 95-98%. However, most coronavirus transmission occurs from direct close, unmasked interactions that are unlikely to be impacted by ionization. Placing ionizers into the environment would not preclude the need to frequently wash hands, socially distance, and wear a mask.

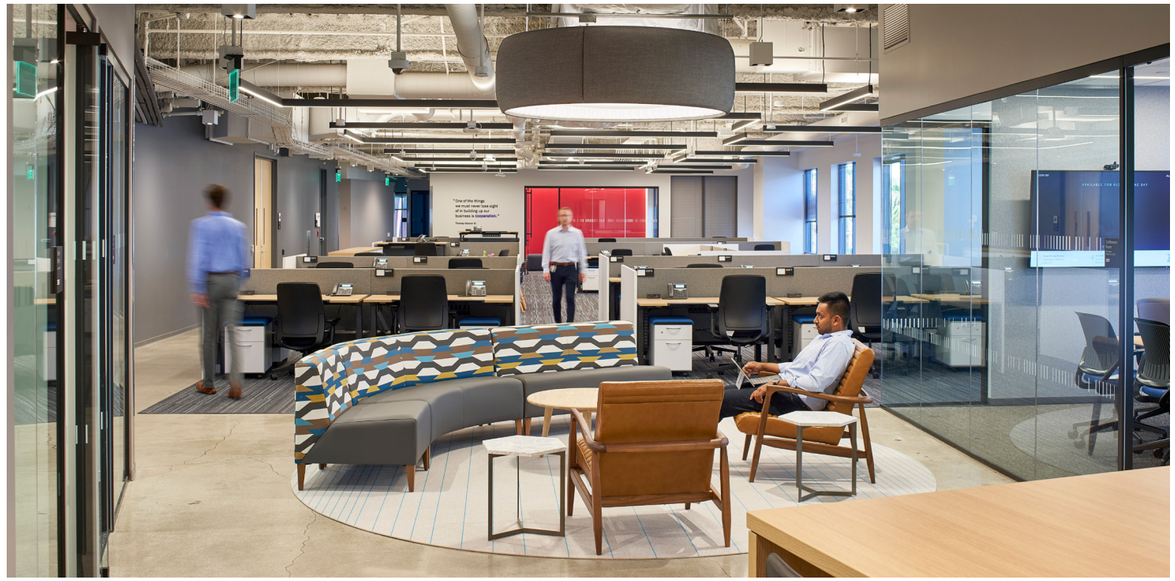
DR. BAHNFLETH: Some studies report actual inactivation of viruses and bacteria by negative ions, but since inactivation efficiency may be considerably less than 100% there is the possibility that viruses that are removed from the air by increased settling due to agglomeration and electrostatic capture may still be active. This could create somewhat increased potential for fomite transfer and perhaps also for exposure by resuspension. However, the fomite route is, to date, considered not to be a major contributor to infection risk and risk due to resuspension is only beginning to be studied. Particles that are captured by electrostatic forces are probably less likely to be resuspended by mechanical and aerodynamic disturbances like walking and vacuuming.

DR. KAISER: A goal of ionization is to create larger particles that then are more easily collected through the filtration system. It also works by creating heavier droplets that fall to the floor (or conceivably onto your keyboard or desk). That said, if there is a good cleaning protocol in place, additional cleaning is not expected to be necessary.

DR. BAHNFLETH: I am aware of anecdotal reports of soiling of surfaces in spaces treated by ionizers (there are many types). I agree with Dr. Kaiser that even if this happens it would not necessitate deviation from cleaning protocols intended to prevent fomite transmission of COVID-19.

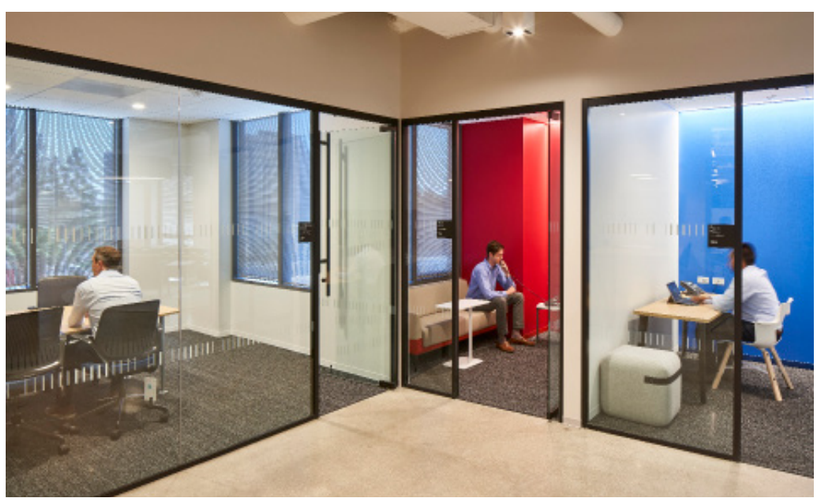
OPERABLE WINDOWS

Spaces with poor ventilation and/or high amounts of recirculated air are at high risk of spreading COVID-19. One simple, low cost option **to mitigate spread is utilizing natural ventilation, and opening windows** where possible.



FLEXIBLE WORK ENVIRONMENTS

OPEN SPACES THAT ALLOW FOR PHYSICAL DISTANCING ARE CRUCIAL FOR REOCCUPYING A SPACE



Q Is there a current position on the harm of inhaling ions produced by bipolar ionization?

DR. BAHNFLETH: Aside from claims about the benefits of negative ions, my understanding is the possible adverse effects of ionizers, whether directly from inhaling them or from impacts on uptake of particulate matter in the respiratory system are not well studied. There are studies in the literature that report adverse effects from positive ions and no effects from negative ions. The literature is not clear.

Q Can Indoor Air Quality (IAQ) sensors improve bipolar ionization systems monitoring?

DR. BAHNFLETH: Continuous biological sampling is what is really needed at the moment. Measurement of trends in airborne particulate matter could give an indication of effectiveness and measurement of ion density could be an indication of performance as recommended by the manufacturer. Pre/post-intervention sampling to assess ambient microbial levels would be an indicator of effectiveness. Sampling of airborne PM is another measure that may be useful as agglomeration of particles that increases deposition is a primary claim of ionizer effectiveness.

The question that remains is whether bipolar ionization is a proven approach to mitigating viral spread, particularly the SARS-CoV2 partial that causes COVID-19. The general lack of testing creates questions about suitability, and, therefore **we are not recommending it for the inactivation of the SARS-CoV2 Virus at this time**.

Instead, we focus on the following:

- Natural Ventilation / Increase Mechanical Ventilation
- MERV 13 or Better Filtration Systems
- Upper Room UV Lighting

Stay tuned to your inbox for similar deep dives into each of these design integrations.

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