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This document was created to help educate you on the use of IONIZATION to protect yourself, those you love, and those you are responsible for from the devastating effects of the current pandemic / coronavirus / Covid 19. Below the website hotlink I have listed "Cliff Note" style information so that you may educate yourself as well as validate my research.

Respectfully,

Mold Assessment Consultant MAC1452 Expires 10/12/2021

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4477231/>

This 23 June 2015 Published report documents / validates the use of ionization to reduce / inactivate airborne viruses.

A Must read:

here they place a cage of 4 infected guinea pigs 15 cm away from a cage of 4 healthy guinea pigs, place a fan blowing across the infected cage towards the healthy cage for 24 hours: Results: 3 of the 4 guinea pigs got infected

Doing the same experiment with air blowing across the infected cage towards the healthy cage only this time they placed an ionizer between the 2 cages for the same 24 hours. Results: NO / none of the 4 healthy guinea pigs got sick

Describes a modified ionizer device used to collect, eliminate and identify viruses from the air, to rapidly detect and prevent outbreaks and spread of infectious diseases. With the use of electron microscope, they document the reduction of airborne microbes. They also validate the use an ionizer between cages of infected / noninfected guinea pigs that prevented airborne transmission of a strain of influenza virus.

Abstract

By the use of a modified ionizer device we describe effective prevention of airborne transmitted influenza A (strain Panama 99) virus infection between animals and inactivation of virus (>97%). Active ionizer prevented 100% (4/4) of guinea pigs from infection. Moreover, the device effectively captured airborne transmitted calicivirus, rotavirus and influenza virus, with recovery rates up to 21% after 40 min in a 19 m³ room. The ionizer generates negative ions, rendering airborne particles/aerosol droplets negatively charged and electrostatically attracts them to a positively charged collector plate. Trapped viruses are then identified by reverse transcription quantitative real-time PCR. The device enables unique possibilities for rapid and simple removal of virus from air and offers possibilities to simultaneously identify and prevent airborne transmission of viruses.

There is an urgent need for simple, portable and sensitive devices to collect, eliminate and identify viruses from air, to rapidly detect and prevent outbreaks and spread of infectious diseases¹. Each year, infectious diseases cause millions of deaths around the world and **many of the most common infectious pathogens are spread by droplets or aerosols caused by cough, sneeze, vomiting etc.**^{2,3,4,5}. Knowledge of aerosol transmission mechanisms are limited for most pathogens, although spread by air is an important transmission route for many pathogens including viruses⁶.

Today no simple validated technology exists which can rapidly and easily collect viruses from air and identify them. The problem is not the analyzing technique, since molecular biological methods such as real-time PCR enable a sensitive detection system of most pathogens^{7,8,9}. **The difficulty is to develop an effective sampling method to rapidly collect small airborne particles including viruses from large volumes of air. Furthermore, the sampling method should be robust with easy handling to enable a wide distribution and application in many types of environment.** At present, the most commonly used techniques aimed to collect pathogens from air are airflow and liquid models^{10,11,12,13,14,15}. These systems are complex, and their efficiency has not been thoroughly evaluated.

Spread of infectious diseases in hospitals can be most significant^{16,17,18}. In many situations there is a need for a pathogen- and particle-free environment, e.g. in operation wards, environments for immunosuppressed patients as well as for patients with serious allergies. This makes it desirable to have a method not only for collection and identification¹⁹, but also for eliminating virus and other pathogens from air²⁰. Ozone gas has been shown to inactivate norovirus and may be used in empty rooms to decontaminate surfaces, however in rooms with patients ozone should not be used due to its toxicity²¹. Generation of negative ions has previously been shown to reduce transmission of Newcastle disease virus^{22,23} and several kind of bacteria^{24,25} in animal experimental set-ups.

The ionizing device used in this study operates at 12 V and generates negative ionizations in an electric field, which collide with and charge the aerosol particles. Those are then captured by a positively charged collector plate. For safety reasons, the collector plate has a very low current, less than 80 μ A, however the ionizer accelerates a voltage of more than 200,000 eV, which enables high production of several billion electrons per second. Moreover, **this device does not produce detectable levels of ozone and can thus be safely used in all environments.**

This technique is known to effectively collect and eliminate cat-allergens from air²⁶. Aerosolized rotavirus, calicivirus and influenza virus particles exposed to the ionizing device were attracted to the collector plate and subsequently identified by electron microscopy and reverse transcription quantitative real-time PCR techniques. **Most importantly, we demonstrate that this technology can be used to prevent airborne-transmitted influenza virus infections.**

Ionizing air reduces calicivirus and rotavirus infectivity

Next we **determined if collected viruses retained their infectivity after being exposed to negative ions and/or after being exposed to the positively charged collector plate.** Five mL of cell culture medium (Eagles Minimal Essential Media (Eagles MEM)) containing 1×10^6 peroxidase forming units of rotavirus respectively of CaCV were aerosolized and collected during 40 min to an active collector plate, containing 1 mL of Eagles MEM. CaCV in cell culture medium was also directly exposed to an active and inactive collector plate, without being aerosolized. Viral infectivity was determined essentially as described³⁰ and the ratio between viral genome copy numbers versus infectivity was compared between aerosolized virus, virus exposed to active- and inactive collector plates and the viral stocks. CaCV exposed to an active collector plate, without being aerosolized, showed a slight reduction in infectivity (~40%) in comparison to virus that have been trapped on an inactive collector plate (Table 2). In contrast, **the infectivity of aerosolized viruses was greatly reduced by >97%, indicating that ionization of the aerosol accounts for the vast majority of infectivity reduction, and not the exposure to the charged collector plate. Further support that ionizing was the mechanism by which viruses lost infectivity** comes from experiments where rotavirus was nebulized without ionizing and allowed to be trapped to an inactive collector plate. Collectors were located at 30 cm from the nebulizer. The result concluded that the genome copy versus infectivity ratio was unchanged from that of the viral stock, thus **suggesting that inactivation of virus is associated with ionized air.**

Discussion

We describe a simple ionizing device operating at 12 volt that can prevent spread of airborne transmitted viral infections between animals in a controlled setting, whilst simultaneously collecting virus from air for rapid identification.

Inactivation of viruses by electrostatic attraction has only been briefly investigated³⁵. In the present study, rotavirus and CaCV lost significant (>97%) infectivity (ratio; CaCV from 3.0×10^{-2} to $<7.8 \times 10^{-4}$ and rotavirus from 4.9×10^{-1} to $<7.6 \times 10^{-3}$) in ionized air as determined by a ratio of infectivity versus gene copies. The mechanism of inactivation was not explicitly investigated in this study, but inactivation mechanisms may include reactive species and/or increased protein charge levels, which could inactivate virus as previously described^{36,37}. **Reduced infectivity has been proposed to be due to reactive oxygen species and ozone, through lipid- and protein peroxidation reactions that may cause damage and destruction to the viral lipid envelope and protein capsid**³⁶. In particular, protein peroxidation may play a key role in the inactivation of non-enveloped viruses, such as adenovirus, poliovirus and other enteroviruses such as rota- and caliciviruses. Enveloped viruses are suggested to lose infectivity due to lipid peroxidation. However, **the cytotoxicity of ozone creates a major obstacle for the clinical application of ozone. It has been shown that increasing the ion concentration of the air efficiently protect chickens from air-born transmission of lethal Newcastle disease virus infection**²³. **The exact mechanism of negative ion inactivation of viruses has not been shown and needs to be further investigated.** However, **in a study using generation of negative and positive ions, influenza virus was inactivated although ozone level was negligible (0.005 ppm or less)**³⁷.

Our device released a steady-state ozone concentration below the detection limit (0.002 ppm) as tested by VTT (Technical Research Center of Finland, Tampere, Finland) and by Air Resources Board in the US, **thus ozone cannot in this case be a contributor of viral inactivation.** However, reactive radicals such as $\bullet\text{O}_2^-$ may be generated, which may contribute to inactivation through damage to either the protein or the nucleic acid structure of the viruses³⁷. As infectivity was not lost when virus was nebulized into the air of the room without ionization and only slightly reduced when applied directly on the positively charged collector plate, it is **suggested that most reduction of infectivity may be due to increased negative charged levels, presumably resulting in changes in isoelectric point and thus structural changes of the capsid.** As the two viruses investigated are non-enveloped, lipid modification can be ruled out.

Most interesting, and of great clinical significance of this study was the **novel finding that the ionizing device could detect and prevent influenza virus infection in a controlled setting, mimicking “authentic” conditions.**

The described ionizing device coupled with RT-qPCR assays has a clear diagnostic potential. The easy handling, low cost, free of ozone production, robustness, high efficiency and low-voltage (12 volt) operation enables large-scale use. Locations critical for infectious spread, such as airplanes, hospitals, day-care centres, school environments and other public places could thus be monitored and controlled by the collection and analysis of airborne viruses and other pathogens on the collector plate. The device also show potential for transmission prevention, although the potency needs to be further investigated in real-life settings.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC470454/>

Effect of long-term ionized air treatment on patients with bronchial asthma. This article documents Seven patients with bronchial asthma requiring continuous medication were subjected to eight weeks of nocturnal exposure to negatively ionized air. During the study, four patients showed significant increases in morning lung function, which in two of these patients was not sustained when exposure ceased. Results: Sleeping with negatively ionized air may lead to an improvement in some patients with asthma.

Seven patients with bronchial asthma requiring continuous medication were **subjected to eight weeks of nocturnal exposure to negatively ionized air**, and their progress was followed using objective tests of lung function and clinical assessment.

At the outset we did not expect to find that exposure to negatively ionized air would affect our patients; however, a significant and sustained improvement in the morning PEFR was observed in some patients during the active ionizer period, suggesting an interaction between negatively ionized air and airway calibre.

During exposure, four patients showed significant increases in morning PEFR, which in two of these patients was not sustained when exposure ceased. In two patients the observed increase in PEFR was accompanied by subjective improvement. From the results of all our assessments we conclude that, although this **treatment may lead to an improvement in some patients with asthma**, further objective studies are required to determine the value of negatively ionized air in the routine management of asthma.

Although the number of patients in the present study was small, it **seems reasonable to infer from the results that it is unlikely that exposure to negative ions will be of significant benefit in the majority of patients with asthma.**

<https://www.airoasis.com/knowledgebase/air-ionizer-benefits/>
<https://www.airoasis.com/product-category/hvac/>
<https://www.airoasis.com/shop/bi-polar-2400/>

This manufacturers retail website is very polished and professional and has lots of information regarding ionization and its benefits

Air Ionizer Benefits

An air ionizer purifies the air in a room by electrically charging air molecules. Many air purifiers use fans and filters to remove contaminants from the air. Air ionizers use ions to remove particulates, microbes, and odors from the air. **Air ionizers make the air in a room healthier for people to breathe, especially for people suffering from allergies, asthma, and other respiratory-related ailments.** What is an air ionizer? It is essentially a life-saver for anyone who uses one.

What Does an Ionizer Do?

Air ionizers rely on the chemical properties of ions. **An ion is a negatively or positively charged particle.** What does an ionizer do? **Air ionizers create negative ions using electricity and then discharge them into the air. These negative ions attach to positively charged particles in the room, such as dust, bacteria, pollen, smoke, and other allergens.** The positively charged particles and negative ions bond together to create dense dirt particles that cannot float in the air. These heavier dirt particles fall to the ground and wait to be swept up at a later time. Some particles might fall onto other surfaces in the room, such as television screens, computers, countertops, and sofas. Homeowners can easily clean these surfaces by dusting or wiping them off with a rag.

Air Ionizer Benefits

Is an ionizer good for health? **Evidence shows that air ionizers purify the air of bacteria, dust, cigarette smoke, molds, soot, pollen, and household odors.** This has a significant impact on people suffering from hay fever and other seasonal allergies. Asthma sufferers have also noticed a difference in the quality of air they breathe after using an air ionizer.

Revolutionary Air Ionizer Effectively Reduces Indoor Air Pollution

We offer the best **air ionizer technology on the market that will kill microbes, including most bacteria, protozoa, fungi, and mold,** that are commonly found in residential and commercial establishments. Some molds produce certain harmful chemicals, such as mycotoxins and volatile organic compounds (VOC). Studies conducted by **Dr. Nabarun Ghosh at West Texas A&M University have suggested that our products are highly effective at reducing microbes.** In fact, there are up to seven case studies attesting to these outstanding performance results. One case study saw a 91.67 percent reduction of bacteria in a cheese factory in Italy while using our products. In addition, **a grocery chain with more than 150 locations found that our products proved superior in sanitizing surfaces than using standard bleach products.**

<https://www.tipe.com.cn/index.php/blog/post/29/nano-pco-technology-most-effective-air-purification-process-for-both-indoor-and-outdoor-applications>

Photocatalysis is the use of UV light illuminating a specialized surface that then produces positive and negative ions, drawbacks are the cost of UV light replacement as well as amount of ions generated will probably be less than other means that are more affordable

Nano PCO Technology – Most Effective Air Purification Process for both Indoor and Outdoor Applications

Have you heard about the air-purification process through Photocatalysis? Well, it may sound complicated, but it is true that light energy can now effectively purify the air from those organic pollutants. Light is one of the vital energy sources, which enhances the living conditions on this earth.

With the development of Nano technology, the concept of photocatalysis came into existence. Nano photocatalytic titanium dioxide can easily circulate in the air and can remove the nasty air pollutants without any difficulty. Indeed, this photocatalysis method seems to be an innovative weapon for better health and cleaner air. The main objective of nano photocatalysis technology is to ensure both outdoor air purification as well as indoor air purification. Every day, a human deal with 85% harmful gases in the air, like VOCs, benzene, formaldehyde, car exhausts NOx and others. All these air pollutants can highly deteriorate the health conditions of individuals. Keeping the rising risks of air pollutants, TIPE initiated the nano photocatalytic technology.

Features of Nano PCO Technology –

- Purify and mineralize harmful gases to CO₂ and H₂O.
- Cause no extra pollution and is environmental friendly in nature.
- Longtime performance, organic pollutant decomposition, catalytic action mode
- Easily eliminate airborne virus and bacteria
- Remove the bad odor from the air and ensures fresh air circulation in the chamber.

Working Mechanism of Nano Photocatalysis –

In the **presence of light, nano photocatalyst titanium dioxide produces pairs of electrons and holes.** This combination then reacts with the harmful air pollutants in order to stabilize them. The entire reaction process is pretty similar to Einstein's photoelectric effect. But in the photocatalysis process, the pollutants are not only filtered but are also decomposed instantly. And this is the main reason, why there is no trace of any pollution during the purification process. To enhance the performance of this technology in indoor air purification, we have developed a unique VLR photocatalyst technology. Thus, this Nano photocatalysis is one of the best methods to ensure air purification without any worries.

If you are interested in availing the Nano photocatalysis for air purification process, then simply give us a call at +86 21 6363 4152.

