

Atn. Dr Carlos Federico Arias Ortiz

carlos.arias@ibit.unam.mx

The New World Role of Hypochlorous Acid – HOCl

as the Most Effective Fighting Agent against COVID / OMICRON

THE BIG PROBLEMS: Mutating Viruses

We are facing a biological catastrophe that bring great disruption and challenges to society as we know it today related to a fundamental change evolving in microorganisms – namely, mutation – that has been occurring since inception but is currently unfolding in a more aggressive pattern.

Microorganisms, including viruses and bacteria, are, in effect, “smart”. As Nature predicts, they adapt and mutate to survive and thrive in the world, often in ways highly unfavorable to humans.

The COVID-19 pandemic is caused by SARS-CoV-2, which is a newly mutated virus that originated in animals and moved to humans. COVID-19 represents only one of multiple worldwide illnesses caused by mutated pathogens.

People around the globe are facing an alarmingly changing world in which such mutations of viruses are creating human epidemics and pandemics with enormous consequences associated with human morbidity and mortality and resulting in huge societal costs. Humans have little natural defense against these newly introduced pathogens. We are vulnerable.

The New World Role of Hypochlorous Acid

PROPOSING A DRAMATIC IMPROVEMENT TO DISINFECTION AND SANITATION

Actual available sanitizers and disinfectants represent the state of the art in cleaning, sanitizing and disinfecting technology but the great majority of these products contain toxic chemicals.

One action to take in addressing this burgeoning crisis is to use a truly “ideal” sanitizer/disinfectant – one that is non-toxic while also being highly effective. We highly suggest to promote and introduce in the market hypochlorous acid -HOCl – as a new sanitizer/disinfectant for overall universal use. Pathogens simply cannot develop resistance against HOCl. It is operationally 99.99% efficient as a pathogen killing agent.

HOCl sanitizing and disinfectant products provide the revolutionary solution Instead of dwelling on the negative issues in sanitizing / disinfection. The introduction of this totally non-toxic, highly-effective sanitizer/disinfectant product powered by hypochlorous acid (HOCl) in a stabilized, near neutral pH between 6 -6.5, obtained by a simple process developed by CONVE in Mexico in a stabilized buffered solution with NaHCO₃ provides a revolutionary a non-toxic, safe and 99.99 effective solution in eliminating viruses, bacteria, fungus and mold both on surfaces and in the air, establishing herewith a baseline for new industry-wide disinfection standards.

HOCl does just this: it is a non-toxic product which is a highly effective sanitizer / disinfectant that kills all pathogens without producing any adverse effects on humans.

HOCL DRY-FOGGING KILLS CORONAVIRUS BOTH IN THE AIR AND ON SURFACES

HOCL solutions administered via a free-standing, portable ultrasonic aerosolizer produces a light fog covering up to 5,000 square feet. The mist consists of

The New World Role of Hypochlorous Acid

aerosolized particles, 2-4 microns in size, which hang in the air, creating a very slight haze, while also effectively coating surfaces without wetting (“dry-fogging”).

The EPA has protocols for determining pathogen kill rates on surfaces but none for the efficacy of sanitizing/ disinfecting the air, because, until now, standard cleaning solutions were too toxic to continually aerosolize into our rooms while we were living in them, so why would anyone trying to measure the results of what we are proposing?

In an initial fogging experiment, an EPA-approved surrogate for the COVID virus (Human Coronavirus OC43) was continuously injected along with a fogged HOCl solution. After infusion was begun, viral concentration measurements were taken at 10, 20 and 30 minutes. This means fresh virus constantly replaced what was killed. Thus, the air in the room was never completely without live virus.

Second, HOCl quickly dispatches pathogens more difficult to kill than Coronavirus. So, in order to seriously test the effectiveness of the fogging process, an enormous viral concentration of about 33,000,000 times that of a sneeze from a SARS-CoV-2-infected person was injected into the air on a continuous basis.

Even with those two extreme challenges, before the first measurement at 10 minutes, the misting procedure was established and an average equilibrium point of almost 95.6% kill was maintained throughout the 30-minute trial, effectively counterbalancing an exponentially increasing virus load in the room. Further research into efficacy of viral kill is in process. Below is a graph of the balanced equilibrium with the blue line tracking the viral injection and the green line tracking the kill rate.

In the context of the pandemic health crisis, these results offer a promising advance in mitigation strategy, available while people are congregating together in a room.

The New World Role of Hypochlorous Acid

In a second fogging experiment, the virus (again, Human Coronavirus OC43) was placed on a glass plates surface and the room was continuously fogged in a manner simulating a standard workday, resulting in a >99.999%* reduction of the virus.

Surface Viral Kill Rates Following Exposure to Aerosolized HOCl (Dry-Fogging)

| Virus | Results |
|------------------------|--------------------|
| Human Coronavirus OC43 | 99.999% Reduction* |

**Value represents the method's detection limit.*

HIGHLIGHTING A MAJOR NEW TREATMENT IMPLICATION:

Vaporized HOCl dry-fogging will attack and kill viruses both in the air and on surfaces.

The CDC has acknowledged spread of the virus both through surface contact and from transmission through the air, so talking could result in droplets staying airborne for 5-10 minutes, thereby resulting in viral transmission.¹⁴⁻²¹ Smaller, aerosol sized droplets have been shown to stay suspended for several hours and can carry viruses such as SARS-CoV-2. But vaporized HOCL, when used in dry fogging, effectively attacks and kills viruses both in the air (droplets or aerosolized) and on surfaces within seconds to minutes.

PROPOSING A NEW CLEANING AND SANITIZING/DISINFECTING PARADIGM

Power misting and dry-fogging with vaporized HOCl reduces biofilm without manual wiping and also effectively kills bacteria and viruses, molds and fungi, quickly and thoroughly on surfaces. This remarkable finding literally changes the way we think about cleaning, sanitizing, and disinfecting of those surfaces.

Dry-fogging with vaporized HOCl attacks and kills viruses in the air as well as on surfaces creating a new modality for treating and preventing airborne viral infections such as the common cold, flue, SARS- CoV-2 and others.

The New World Role of Hypochlorous Acid

Dry-fogging and misting with vaporized HOCl provides these powerful effects safely so that sanitizing/disinfecting a space can occur with no ill effects while people (e.g., patients or families at home or children and teachers and administrators in schools) remain present.

HOCL ALSO PROVIDES A MEANS TO ADDRESS BOTH “SUPERBUGS” AND MUTATING VIRUSES

One approach to addressing the daunting challenges of “superbugs” and mutating viruses is to use a non-toxic, highly effective disinfectant at the source where the pathogens exist – namely the environment. In essence, the aim is to kill the pathogen before it has the opportunity to invade the human body – and to do it in a way that is both safe for humans and for that environment.

BASED ON WHAT IS KNOWN ABOUT PULMONARY MEDICINE, THE RESEARCH CITED IN THIS WHITE PAPER ALONG WITH SUBSTANTIAL ANECDOTAL OBSERVATIONS, SUGGEST THE POSSIBILITY OF IMPROVING TREATMENT OF SELECTED LUNG DISEASES BY USING AEROSOLIZED HOCL AS AN INHALATION THERAPY. FURTHER RESEARCH IS PLANNED TO EVALUATE THIS APPROACH.

Viruses are very small particles (20-400 microns). When they invade the human body, it is typically by way of the respiratory tract: nose and mouth, throat, trachea, bronchi and with some viral particles ending in the smallest lung structures, the acinar sacs lined with alveolar cells, where the transfer of oxygen and carbon dioxide occurs.

The viruses can attach anywhere along that tract, likely first in the nose, throat, and trachea. From there, spread can occur to the lower regions of the lung (bronchioles, alveolae) depending on multiple factors including particle size and shape, humidity, and depth of inspiration. Major and serious infections such as pneumonia occur when alveolar infection occurs in a widespread manner throughout the segments of

The New World Role of Hypochlorous Acid

the lungs. Our laboratory studies have showing that HOCL can be vaporized in aerosolized-sized particles equal to or less than 4 microns, which are small enough to reach the alveolae. Separately, as reported earlier in this paper, studies have also shown that vaporized HOCL will kill coronavirus in the air.

Logically and plausibly, albeit speculatively, it follows that vaporized HOCL could be used adjunctively to treat or even prevent lung infections such as COVID-19 pneumonia. Clinical studies are being developed to test this hypothesis. Until that time, clinical observations have shown a dramatic improvement in patients with viral sore throats or those with flu-like symptoms through simply using vaporized HOCL.

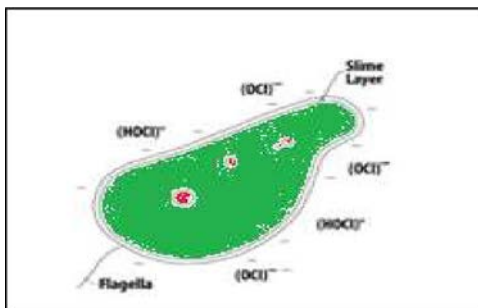
It can be used in a wide variety of fields such as: Medicine, which simplifies the closure of wounds and ulcers of skin and mucosa, whether infected or not, because it has an excellent healing power. Dentistry, indicated for the treatment of Gingivitis, pericoronitis, periodontitis, coma also in the disinfection of instrumental material, equipment and surfaces. In veterinary and zootechnics, in horses, canines, felines, effective in the disinfection of surgical material, feeders, kennels, floors, walls. In food; in handling, packaging, transport, complying with food regulations (decree 3075 of 1997). In agriculture, for the control of a wide range of germs that harm crops and all processes that involve handling of food, surfaces or direct contact involving biological risks.

We obtained a buffered HOCl solution at 400 - 200 ppm with a stability greater than one year, allowing the development and wide application and marketing of the compound, until achieving the first pharmaceutical formulation in the world based on HOCl, certified in USA by EPA and (COFEPRIS in process). This formulation is indicated as an antiseptic solution for the treatment and care of wounds in pathologies of lower limbs such as: venous ulcers, arterial, venous trauma, diabetic foot, the stabilized product we distribute with the name of KleenClor.

The New World Role of Hypochlorous Acid

ANNEX: Explanation of the way HCl acts as disinfectant>

Hypochlorous acid can penetrate silty layers, cell walls and protective layers of



microorganisms, causing their death or causing their reproductive activity to be inhibited. Hypochlorous acid can penetrate silty layers, cell walls and protective layers of microorganisms, causing their death or causing their reproductive activity to be inhibited.

The cell wall of the pathogenic microorganisms is negatively charged. In this way it can be penetrated by hypochlorous acid that has a neutral charge, rather than being penetrated by negatively charged hypochlorite.

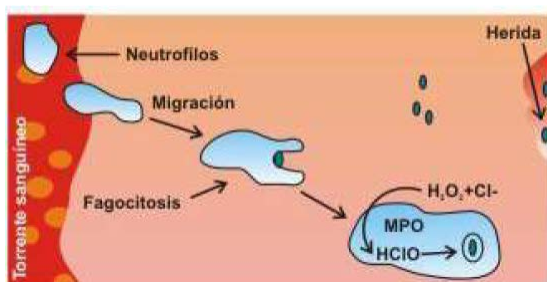
Chemically, the following transformation occurs: After its disinfectant action, the HCLO is transformed into chloride ion with zero disinfectant power.

As a bactericidal disinfectant, hypochlorous acid (HCLO) easily penetrates bacterial cells through the cytoplasmic membrane, acts on proteins and nucleic acids of microorganisms; oxidizes sulfhydryl groups (-SH) and attacks amino, indole and hydroxyphenol groups of tyrosine. The bactericidal activity of bacterial strains of international reference ATCC (American Type Culture Collection) has been determined: *Escheria coli*, *Pseudomonas aeroginosa*, *Salmonella enteritidis*, *Klebsiella Pneumoniae* and *Staphylococcus aureus*, under controlled conditions of time, concentration and temperature; through the technique of Kelsey Maurer and in the presence of a standardized concentration of proteins, obtaining an effectiveness of 99.9%. [1] Its application also occurs in the field of dentistry, where its antimicrobial efficacy has been evaluated on microorganisms with pathogenic potential in the oral cavity, achieving bacterial inhibition at a concentration of 500 ppm for 1 minute

The New World Role of Hypochlorous Acid

Natural Defense Mechanism. Source

Hypochlorous acid (HClO) is part of a new group of microbicidal substances known as "non-antibiotic antimicrobial molecules" that due to its broad spectrum, rapid action and wide margin of safety can be used to control and prevent a wide number of skin and mucosal infections. Biologically it is classified within a group of small molecules known as reactive oxygen species (ROS) synthesized by cells of the immune system Neutrophils and Macrophages, (see figure 2) during an immunological process known as "respiratory burst", during the phagocytosis of antigens in reaction with the enzyme myeloperoxidase, hydrogen peroxide (H_2O_2) and an ion chloride. It works as a chemotactic substance (phenomena in which bacteria and other cells of organisms direct their movements according to the concentration of certain chemical substances) that allow excellent microbial control and activation of the defense system that facilitates the rapid and innocuous repair of tissues. Myeloperoxidase (glycoprotein very abundant in these cells) is the enzyme that catalyzes the passage of hydrogen peroxide to hypochlorous acid in the presence of chlorides. Hypochlorous acid is a molecule with high oxidizing power and excellent biocidal action against a wide variety of bacteria, viruses, yeasts, fungi.



$HOCl \rightarrow \text{Bacteria, Algae, Organic Matter} \rightarrow \text{Destroyed Bacteria \& Algae, Organic Matter Oxidized} + Cl^-$

After its disinfectant action, the HClO is transformed into chloride ion, Cl^- with zero disinfectant power and not toxic.