Overview: CIMRscientific.com Layered Air Defense Systems

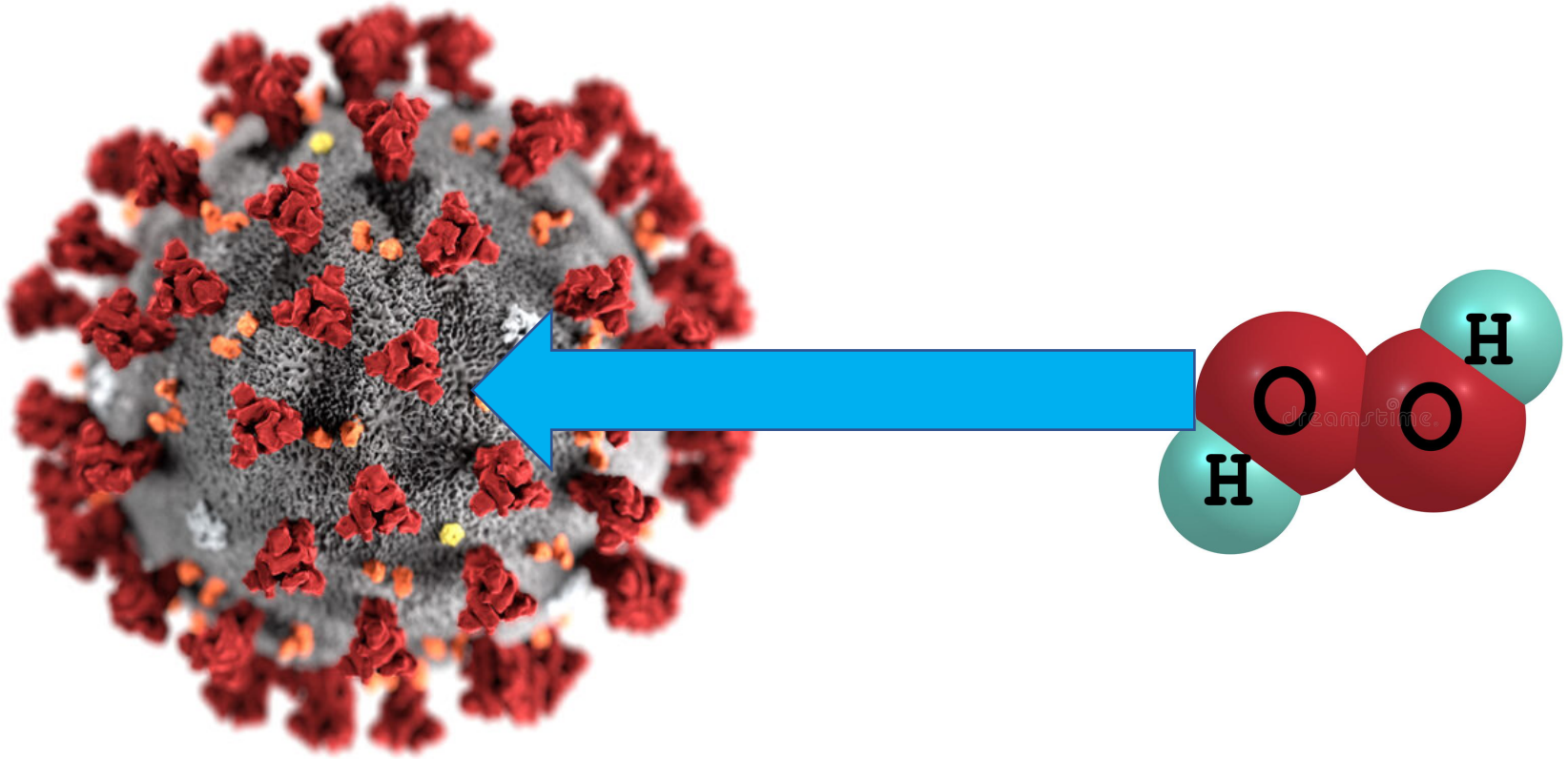
CIMR is the US Military & DOD choice to seek and destroy dangerous pathogens, stop the spread of infectious disease and protect humans against bio-terror infection.

Introduction

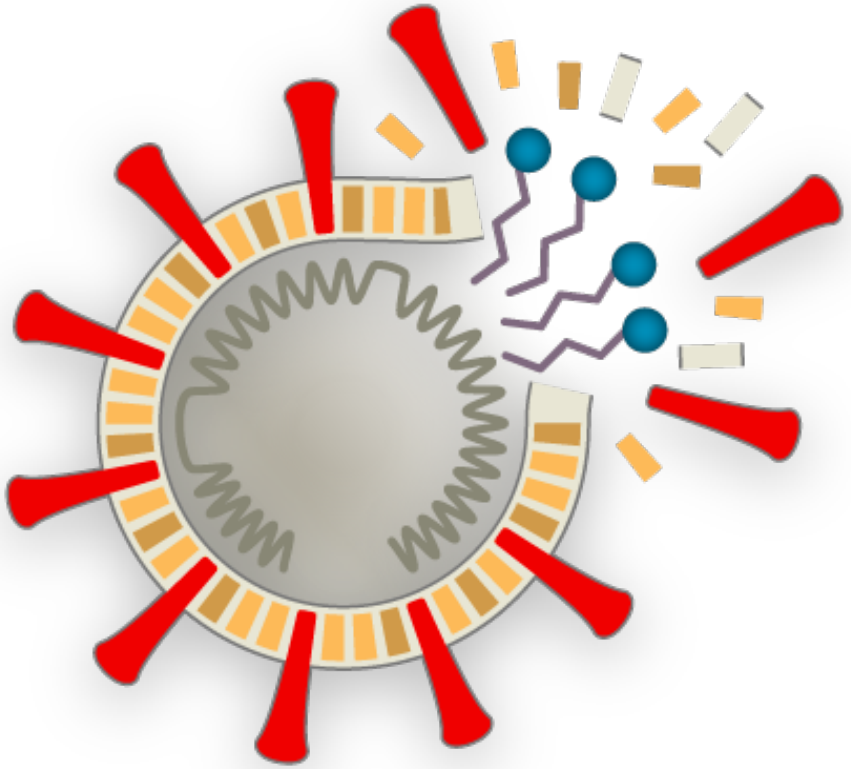
CIMR is the emerging technology to combat the 2019 novel Coronavirus (SARS-CoV-2) in the air and on surfaces

- This year, when the COVID-19 Pandemic engulfed us in an intense way, various prestigious universities, and the United States government itself, its Secretary of Defense and the Pentagon, endorsed the use of Dry Hydrogen Peroxide (DHP), a form of H2O2 single molecule as a preventive and protective measure against COVID-19.
- CIMR is a deadly weapon against this virus and all pathogens.
- Contagions, publicity, protocols, executive orders, information, and misinformation, have taken a toll on our consciences, on our reasoning and on our state of mind. The fear of the unknown paralyzes us, but at the same time, brings out the best in ourselves; our ability to innovate and push forward.
- This is where CIMR comes in with a complete solution to the problem of COVID-19. CIMR's "Dry Hydrogen Peroxide" (DHP) generators work around the clock NON-STOP to kill viruses and bacteria in the air and surfaces, including clothing and even hair and skin.
- Everything and everyone is protected with CIMR cutting-edge technology.
- **CIMR is peace of mind that you can breathe safely**
- The proprietary CIMR Technology uses Low- level Hydrogen Peroxide in gas to protect your workplace or home, keeping the air around you clean around the clock.
- Get rid of viruses like SARS-CoV-2 (COVID-19), bacteria, mold, and other pathogens preemptively before they get the chance to affect the health of clients, coworkers, or loved ones

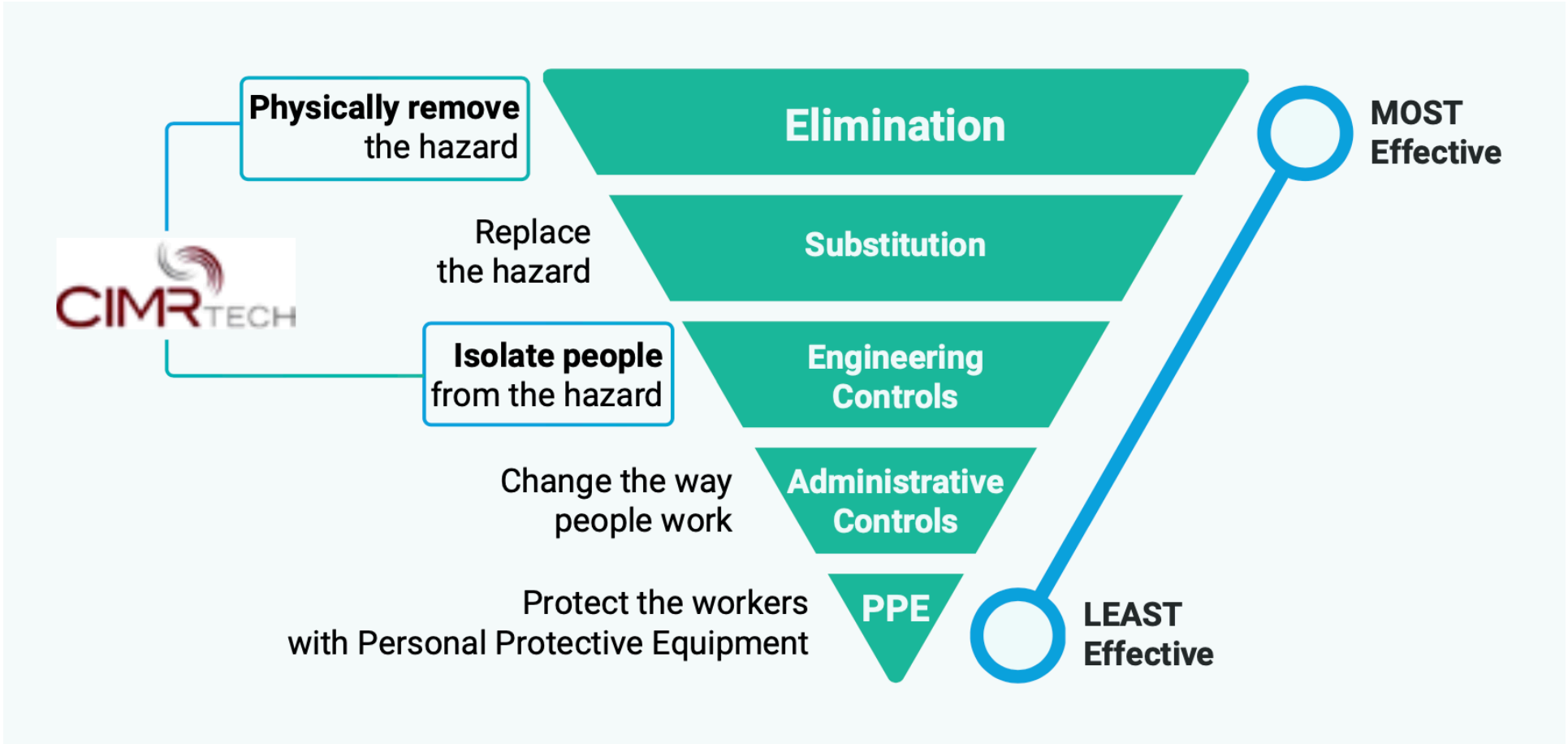
Pathogens such as COVID seek water…they must have it to survive…to exchange waste…to replicate.



Because H2O2 has an extra Oxygen atom, when pathogens take it in, that extra Oxygen reacts and releases energy, blowing up the pathogen cell wall and killing it.



- **How does it seek and destroy viruses, bacteria, mold, mildew & fungi?**
- The core process of this technology is the photocatalytic process in which the gaseous hydrogen peroxide is produced and ionized. This means that the hydrogen peroxide particles have both localized positive and negative charges. Thanks to the electrostatic attraction they are attracted to pathogens and other molecules making the hydrogen peroxide molecules function as a scavenger, homing in and finding these harmful pathogens.
- Hydrogen peroxide is a very effective disinfectant, used in many industries where surfaces need
  to be sterilized such as hospitals, doctors, restaurants, amongst others. Just like the hydrogen peroxide, you can find in your local pharmacy, hydrogen peroxide gas produced
- using this technology kills bacteria and viruses
  by oxidizing the outer membrane of these pathogens, keeping your home or workplace safe.

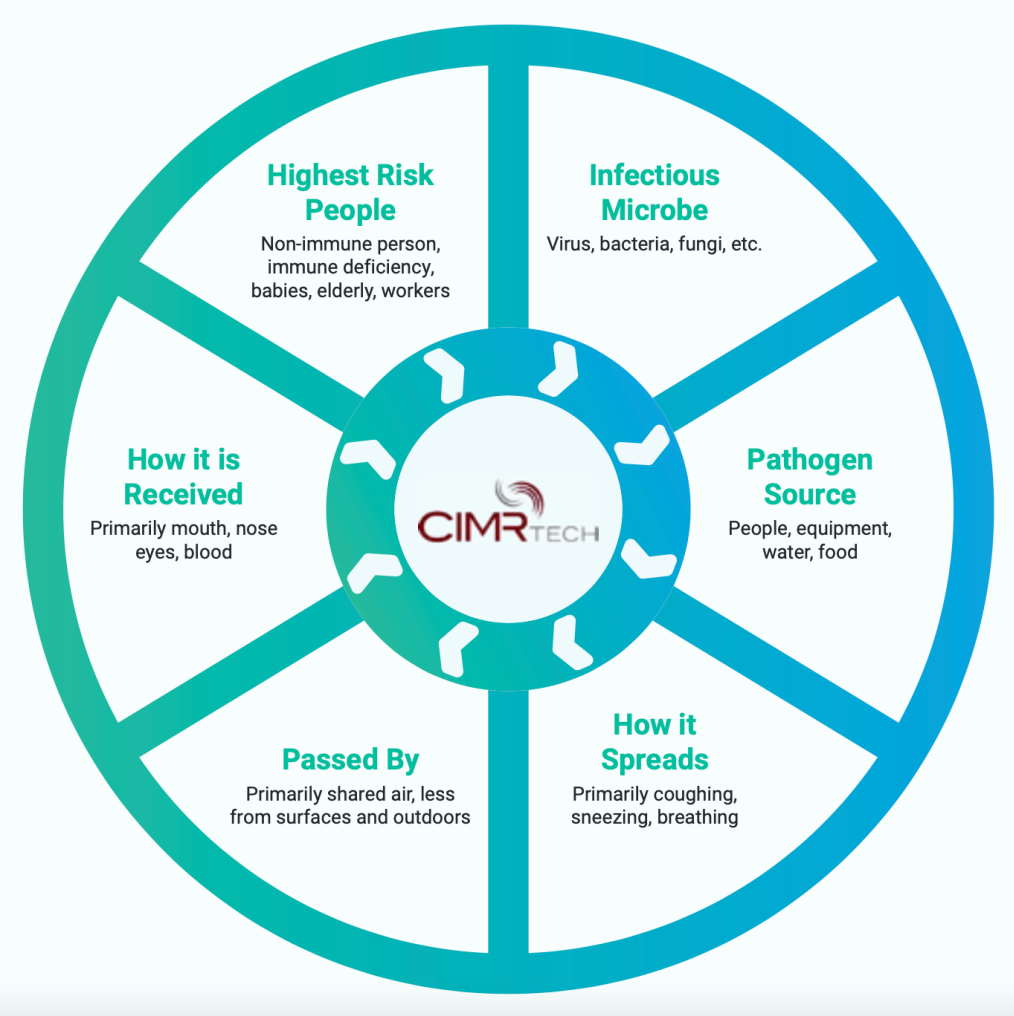

Physically remove the hazard
Elimination
MOST Effective
Replace the hazard
Substitution
Isolate people from the hazard
Engineering Controls
Change the way people work
Administrative Controls
Protect the workers with Personal Protective Equipment
PPE
LEAST Effective

- **What are the benefits of this technology?**
- Disinfection and purification are not the only advantages of CIMR devices, the CIMR technology also offers:
- **Cost avoidance:** CIMR devices are low- cost maintenance; they do not require refills or replacing filters. Furthermore, since this technology works 24/7, you do not need to hire a team to disinfect facilities with other procedures that have recurring costs such as H2O2 or chemical misting.

- **24/7 protection**: CIMR devices can work around the clock continuously producing hydrogen peroxide gas to reach every nook and cranny.
- **Maintain productivity:** Since the device is constantly finding and terminating pathogens, employees are protected while they work, reducing the possibilities of a virus or bacteria affecting them.

Break the chain of infection

CIMR uses the CIMR Technology to break the chain of infection and stop the spread of pathogens in order to protect people.



Do you have proof? Yes!

- CIMR® Infection Control Technology systems have been in the field for years. They have been used in catastrophic events such as Hurricanes Rita, Ike, Katrina, Harvey, Irma and María (2017).
- In all cases our systems were successful in the Stabilization and Remediation cleanup of the buildings.
- Kansas State University and Sandia Labs found that hydrogen peroxide gas technology disinfected 99% of the H5N8 Virus on surfaces within two hours.
- Dr. Marsden of Kansas State University also had this to say based on his research: Kansas State University found that the hydrogen peroxide gas

- technology disinfected surfaces contaminated with MRSA (Methycillin Resistant Staphylococcus Aureus), nonresistant Staphylococcus Aureus, E-Coli, Listeria Monocytogenes, Candida Albicans, Stachybotrus Chartarum (Black Mold), Streptococcus, Pseudomonas, and Bacillus supp. This study demonstrated microbial reduction on contaminated surfaces by 96.4% to 99.9% within the first twenty four (24) hours.
- **Articles and Case Studies**
- The technology that powered CIMR H2O2 generators has been put to the test time and again. You can see these case by clicking on the articles below.

Response to the USAF

Kansas State University
Strategic White Paper Study Report

University of Pittsburgh
Study Report

WHO SARS-CoV-2
Transmission Precautions

CIMR is the not only the BEST at seeking and destroying pathogens; It is the safest for people, pets & plants.

	Element	Common Name	Danger to Humans/Pets	Effect on Pathogens	Warnings from EPA:	Notes
Not Effective	H2O	Water	nominal in most circumstances	They tend to thrive in water	Fecal contaminations of **water** can introduce a variety of **pathogens** into waterways, including **bacteria**, viruses, protozoa and parasitic worms. A very well known **pathogenic bacteria** is Salmonella. ... Cross-infection between people can occur via **water** pollution.	Water, moisture, evaporative cooling condensation, free standing water, so on...all are potentially pathogen playgrounds
SAFE & Effective	H2O2 as DHP	Dry Hydrogen Peroxide	safe below 0.05 ppm	Deadly above 0.02 ppm	**Dry Hydrogen Peroxide** is **safe** for use in occupied settings, **safe** for human exposure. No-touch disinfection technology is effective adjunct to manual cleaning. **Dry Hydrogen Peroxide** shown to be effective no-touch disinfection technology.	Does not seem to log noticable kill rates on good microbial elements, but, deadly to pathogens
DANGER	O3	Ozone	extreme danger to lungs in quantities need for air sanitizing	Deadly above 0.4 ppm	EPA: When inhaled, **ozone** can damage the lungs. Relatively low amounts can cause chest pain, coughing, shortness of breath and throat irritation. **Ozone** may also worsen chronic respiratory diseases such as asthma and compromise the ability of the body to fight respiratory infections.	Kills good and bad microbials indescriminatly
	UV	Ultra Violet Light	extreme danger to vision	Depends on the surfaces being treated and both the strength and duration of sustained UV	Exposure to **UV rays** can cause premature aging of the skin and signs of sun damage such as wrinkles, leathery skin, liver spots, actinic keratosis, and solar elastosis. **UV rays** can also cause eye problems. They can cause the cornea (on the front of the eye) to become inflamed or burned.	Like shining a flashlight, even when moving, still shadows will exist leaving untreated material

Compare CIMR to other pathogen eradication technologies

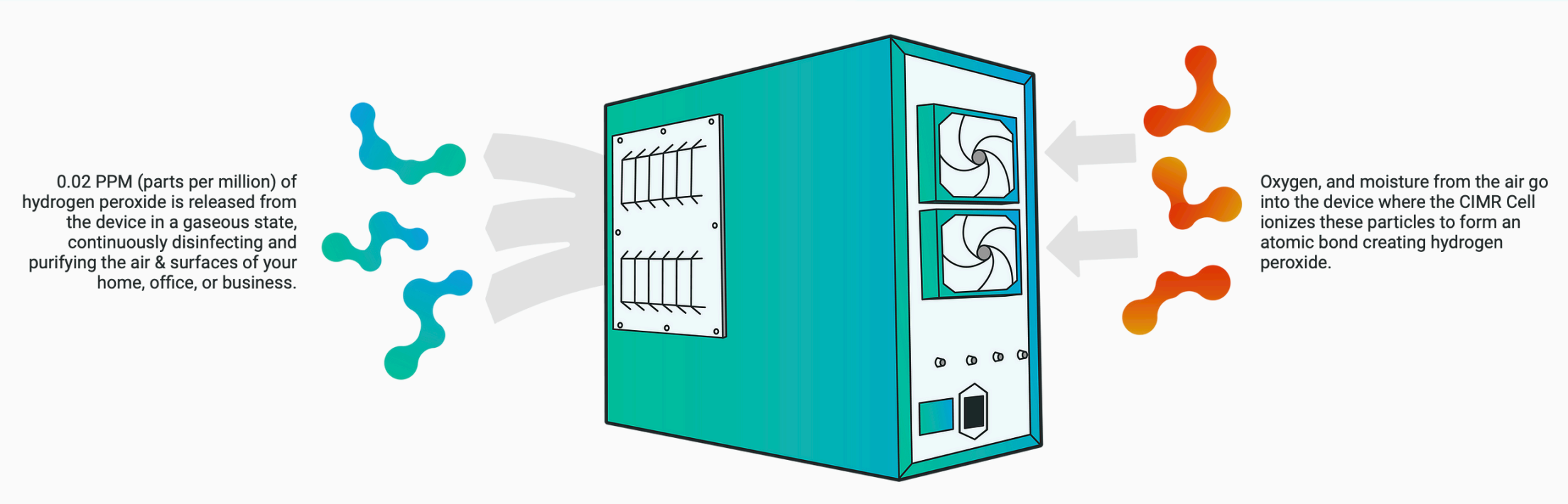
CIMR creates DHP (Dry Hydrogen Peroxide) sometimes referred to as Low-level Hydrogen Peroxide in dry air gas form.

It is actually single, individual H2O2 free floating air molecules.

Pathogens actually seek out the H2O2 and ingest it

That is CIMR H2O2 kills the pathogens

The CIMR technology in action



Evaluation of the Efficacy of CIMRUpdated: Dec 9, 2020

- Bench Mark Comparison of the efficacy of CIMR verses low ozone System in Reducing Murine Norovirus Titers Performed by Dr. Lela Riley, RADIL LLC, Columbia MO November 18, 2008

- **Introduction**

- Members of the genus Norovirus are nonenveloped viruses with a linear, positive-sense, single-stranded RNA genome. Noroviruses are in the family Caliciviridae, which also includes the genera Sapovirus, Lagovirus, and Vesivirus. Formerly known as "Norwalk-like viruses" or "small round structured viruses," noroviruses cause acute gastroenteritis in humans, typically lasting 24 to 48 h, and infect people of all ages.

- Recently, the first murine norovirus, was isolated from mice. This newly described pathogen of mice can be grown in cell culture, providing the first example of a norovirus that can be cultured in vitro. In these studies, the efficacy of CIMR® verses Ecoquest's low ozone platform has been evaluated against Murine norovirus (MNV), as a representative of the Caliciviridae family, using an in vitro culture system.

- **Experimental Design**

- *Virus stock and culture*

- MNV-4 used in this study was maintained in RAW267.4 cells, a murine macrophage cell line. Cells were grown in Dulbecco's modified Eagle's medium (DMEM) supplemented with 10% fetal bovine serum. The virus was propagated, concentrated, and purified. Purified viral stocks were titered via plaque titration. Viral stocks were stored in a -80ºC freezer.

- *Preparation of surfaces*

- To assess efficacy of the CIMR® and EcoQuest's Low-Oxidation (ozone) decontamination systems for reducing MNV titers, virus-contaminated surfaces were exposed to the decontamination system for various time periods. Decontamination was evaluated on three types of surfaces: Stainless steel, carpet and cloth. Stainless steel cassettes measuring 1.5 inches by 1.25 inches were used as the stainless steel surface. Samples of carpet and cloth were cut to 1 inch squares. Prior to the experiment, all surfaces were sterilized in a steam autoclave. To contaminate the surfaces, 200 µL of MNV viral stock (1 x 107 PFU/ml) was pipetted onto the center of each surface, covering ~ 1-2 cm. The surfaces were allowed to air dry in a type II biosafety cabinet. At the end of the hour, the zero time point control samples were collected and the remaining inoculated surfaces were placed in a humidified 280C incubator for either low oxidation treatment or ozone free treatment. A set of four inoculated samples for each surface

- After the specific times of exposure had been reached, the surfaces were immersed into 10 mls DMEM containing 10ug/ml ciprofloxacin. Stainless steel surfaces were scraped with a sterile cell scraper to remove virus from the cassette surface. Carpet and cloth samples were placed in a sterile bag and homogenized for 1 minute in a Stomacher Lab Blender. Samples were removed from the bag and placed in a 15 ml conical centrifuge tube and spun at 1000 x g for 10 minutes to remove residual carpet and cloth fragments. As controls, each surface was inoculated with an equivalent amount of virus and placed in a 280 incubator without treatment to serve as the 24 hour untreated controls. Each of the samples subjected to the decontamination system was tested in quadruplicate at each time point. Controls were also tested in quadruplicate. Data are expressed as an average of all data points.

- *Calculation of viral titer and viral reduction*

- After neutralization of the disinfectant in specified volumes of DMEM, stainless steel surfaces were thoroughly scraped with a sterile cell scraper to elute the virus into the DMEM. Carpet and cloth samples were suspended in sterile DMEM and homogenized using a Stomacher blender to release the virus. The viral titer of each eluate was determined inoculating cell cultures with serial ten-fold dilutions of the eluates, and calculating the tissue culture infective dose 50 (TCID50) based on observations of characteristic cytopathic effects associated with MNV. The final titer was calculated by averaging the individual titers calculated from each replicate and the decrease in viral titer was then calculated.

- **Results**

- The following tables summarize the results of these experiments.

Table 1. Reduction in Murine Norovirus Titer Following CIMR® Treatment

	Stainless steel			Carpet			Cloth		
Treatment time	Untreated ($TCID_{50}$/ml)	Treated ($TCID_{50}$/ml)	Percent decrease from t=0	Untreated ($TCID_{50}$/ml)	Treated ($TCID_{50}$/ml)	Percent decrease from t=0	Untreated ($TCID_{50}$/ml)	Treated ($TCID_{50}$/ml)	Percent decrease from t=0
0 hrs	1.2×10^6			1.6×10^6			4.0×10^5		
2 hrs		3.5×10^5	70.8		3.4×10^5	78.8		2.1×10^4	94.8
4 hrs		3.6×10^4	97.0		7.5×10^4	95.3		1.7×10^4	95.8
6 hrs		1×10^2	99.9		$<1 \times 10^3$	>99.9		$<1 \times 10^3$	>99.8
24 hrs	1×10^3	1×10^2	99.9	$<1 \times 10^3$	$<1 \times 10^3$	>99.9	8.6×10^2	$<1 \times 10^3$	>99.8

Figure 1. Survival of MNV following CIMR® Treatment

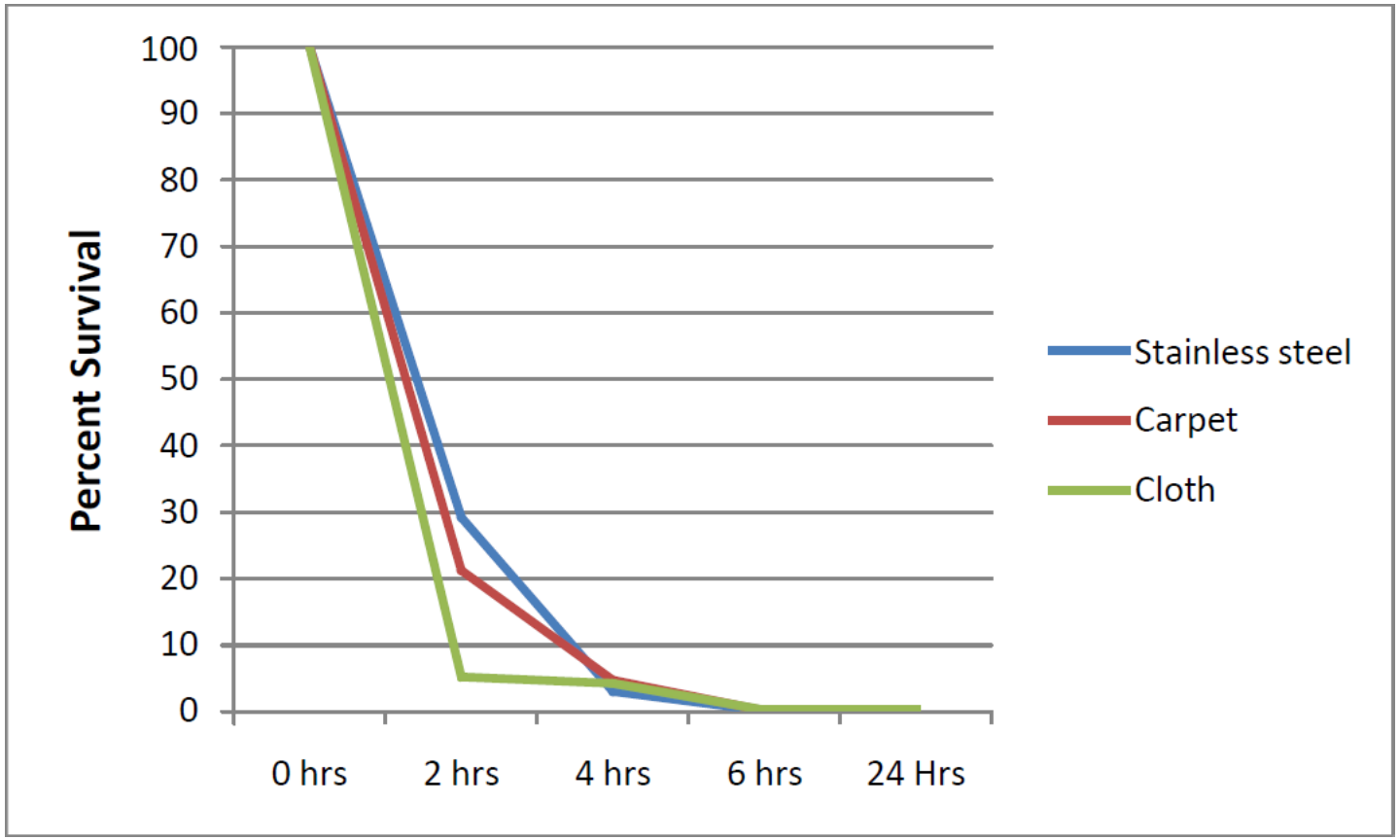
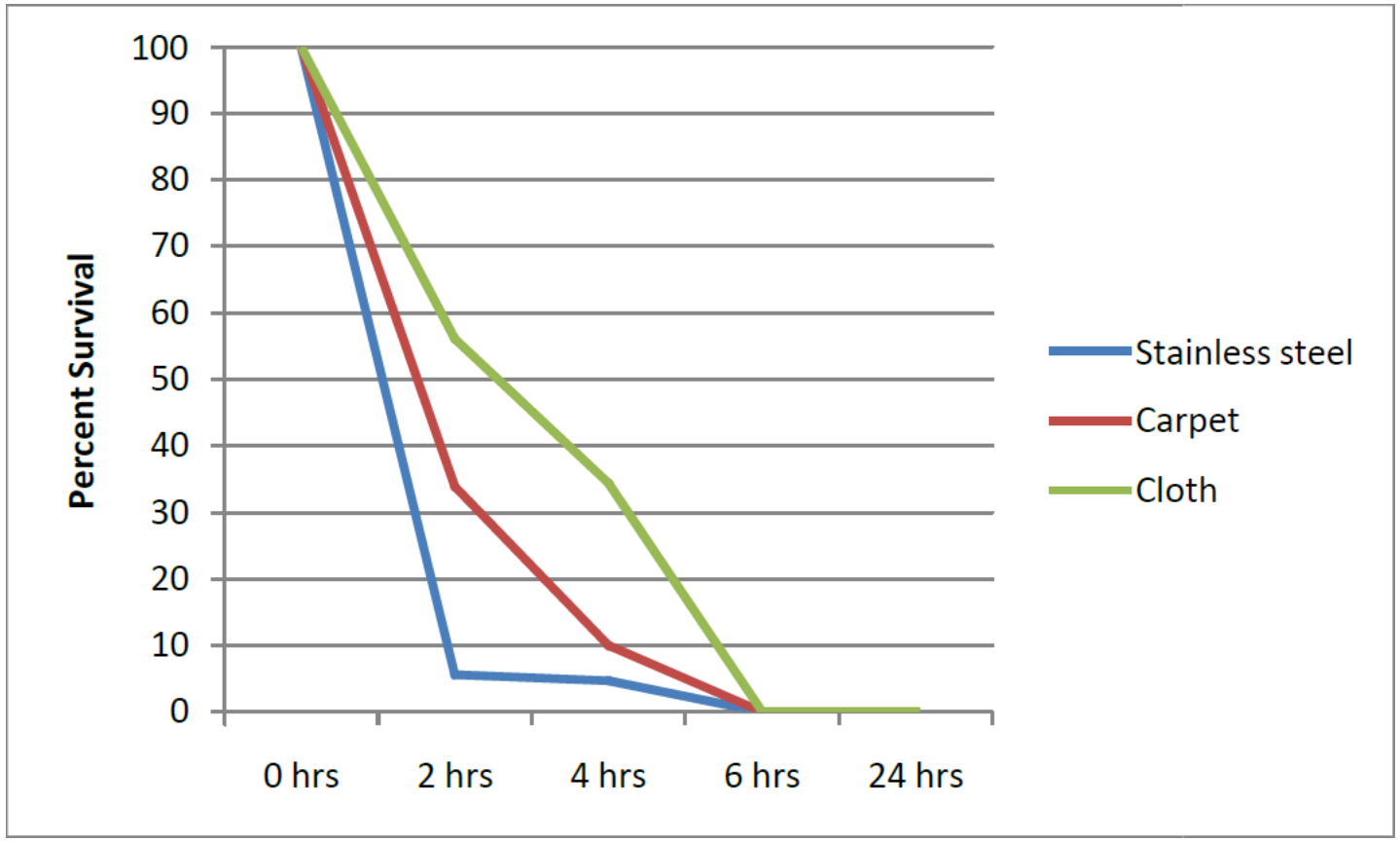


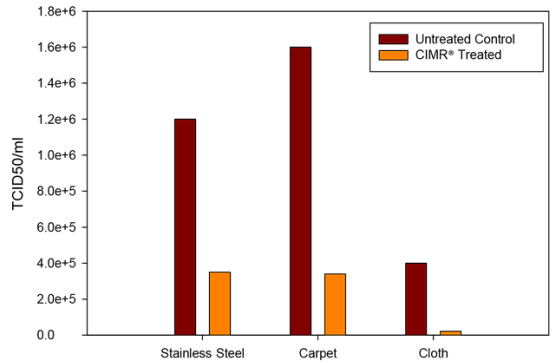
Table 2. Survival of Murine Norovirus following Low-oxidation(ozone) Treatment

	Stainless steel			Carpet			Cloth		
Treatment time	Untreated (TCID $_0$/ml)	Treat d ($TCID_{50}$/ml)	Percent decrease from t=0	Untreated ($TCID_{50}$/ml)	Treated ($TCID_{50}$ ml)	Percent decrease from t=0	Untreated ($TCID_{50}$/ml)	Treated ($TCID_{50}$/ l)	Percent decrease from t=0
0 hrs	1.6×10^5			2.8×10^5			2.5×10^4		
2 hrs		9.03×10^3	94.4		9.5×10^4	66.1		1.4×10^4	44.0
4 hrs		7.6×10^3	95.3		2.8×10^4	90.0		8.6×10^3	65.6
6 hrs		$<1 \times 10^2$	>99.9		$<1 \times 10^3$	>99. 9		$<1 \times 10^2$	>99.6
24 hrs	9.3×10^3	$<1 \times 10^2$	>99.9	$<1 \times 10^3$	$<1 \times 10^3$	>99.9	$<1 \times 10^2$	$<1 \times 10^2$	>99.6

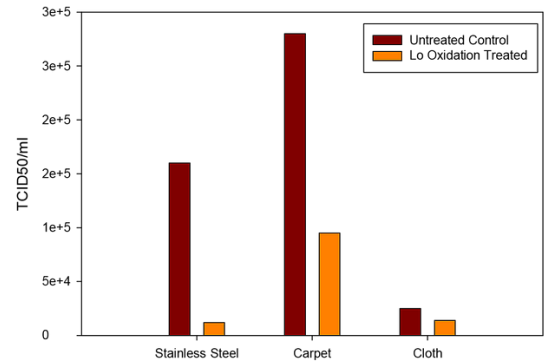
Figure 2. Survival of MNV following Low-Oxidation (ozone) Treatment



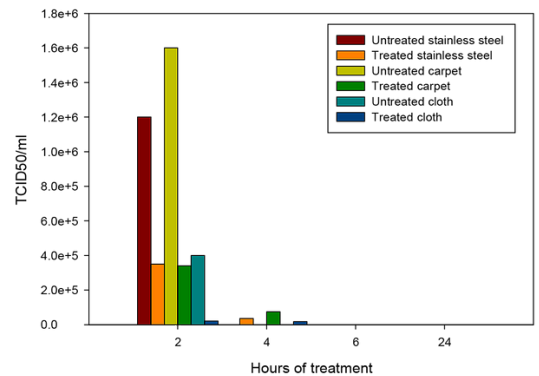
MNV-4 Titers Following Two Hour CIMR® Treatment



MNV-4 Titers Following Two Hour Lo Oxidation (ozone) Active Pure Cell Treatment



MNV-4 Titers Following CIMR® Treatment



MNV-4 Titers Following Low Oxidation (ozone) Active Pure Cell Treatment