November 13, 2009

Sharp's Plasmacluster[*1] Technology Proven Effective in Inhibiting the Activity of Adherent and Airborne Methicillin-Resistant Staphylococcus Aureus[*3] (MRSA), a Typical Bacterial Cause of Hospital-Acquired Infections[*2]

Sharp Corporation, working together with the Kitasato Institute Medical Center Hospital at the Kitasato Institute of Kitasato University, has proven that High-Density Plasmacluster ions inhibit the activity of Methicillin-resistant Staphylococcus aureus (MRSA[*3]), a typical bacterial cause of hospital-acquired infections, both when airborne and when adhering to surfaces.

These experiments proved that high-density Plasmacluster ions (at an ion density of approximately 25,000 ions/cm^3) inhibit the activity of adherent MRSA (as plane state on a petri dish) by approximately 99.9% in eight hours, and the activity of airborne MRSA (as a suspension in a box having a volume of one cubic meter) by approximately 99.9% in 20 minutes.

Additional experiments verified the effectiveness of Plasmacluster ions in inhibiting the activity of airborne multidrug-resistant Pseudomonas aeruginosa[*4] (MDRP) by approximately 99.9%, and the viral infectivity of airborne Coxsackie virus[*5], by approximately 99.9% (see table below for more details on verified efficacy). Both of these microorganisms are similarly the source of hospital-acquired infections.

These experimental proofs demonstrated that high-density Plasmacluster ions have an inhibitory effect on the activity of adherent MRSA, as well as confirmed that the higher the ion density, the greater the inhibitory effect on the activity of airborne MRSA and MDRP and on the infectivity of airborne Coxsackie virus.

Sharp's collaborative research with academic and research organizations[*6] around the world began in 2000 and has since proven that Plasmacluster ions are effective in inhibiting the activity of 28 kinds of harmful substances, including the new-type H1N1 influenza virus[*7]. In 2002, research also confirmed the safety of high-density Plasmacluster ions with respect to human health[*8], and in 2004, joint research with an academic research institution[*9] elucidated the mechanism by which Plasmacluster ions destroy the proteins on the surface of microorganisms.

In the future, Sharp intends to further its efforts for improving the effectiveness of Plasmacluster technology to create a healthy environment.

Verified Effectiveness of Plasmacluster Ions

Target Substance	Ion Density (ions/cm^3)	Verified Effectiveness
Adherent MRSA	25,000	Reduced by approx. 99.9% in 8 hours
Airborne MRSA	25,000	Reduced by approx. 99.9% in 20 minutes
	7,000	Reduced by approx. 99.9% in 30 minutes
Airborne MDRP	25,000	Reduced by approx. 99.9% in 30 minutes
	7,000	Reduced by approx. 99.9% in 40 minutes
Airborne Coxsackie virus	25,000	Reduced by approx. 99.9% in 20 minutes
	7,000	Reduced by approx. 99.9% in 30 minutes

*1 Plasmacluster and Plasmacluster ions are trademarks of Sharp Corporation.

*2 Microorganisms that cause hospital-acquired infections (known as nosocomial infections) include bacteria, viruses and other pathogens that are the source of infections occurring in patients in the clinical setting (hospitals, healthcare facilities, etc.).

*3 MRSA is an acronym for methicillin-resistant Staphylococcus aureus, a bacterium responsible for difficult-to-treat infections in humans. MRSA typically infects humans with weakened immune systems, for example, patients in hospitals, and its resistance to a large group of antibiotics is a serious problem.

*4 MDRP is an acronym for multidrug-resistant Pseudomonas aeruginosa. MDRP infections in critically ill patients have become a serious clinical problem in hospitals and other health care settings because of the limited number of antibiotics that are effective against this bacteria.

*5 Coxsackie virus is a group of human pathogens that can cause nonspecific febrile illnesses (called "summer colds" in Japan), upper respiratory tract disease and meningitis.

*6 Sharp has adopted a collaborative research approach to product marketing in which the effectiveness of a technology is verified based on scientific data developed in collaboration with leading-edge academic research institutions. New products are then brought to market based on the results.

*7 A new-type H1N1 influenza virus first confirmed in Mexico and the US in 2009, which is now causing a global pandemic.

*8 Testing conducted by Mitsubishi Chemical Medience Corporation. (inhalation toxicity, as well as eye and skin irritation/corrosion tests).

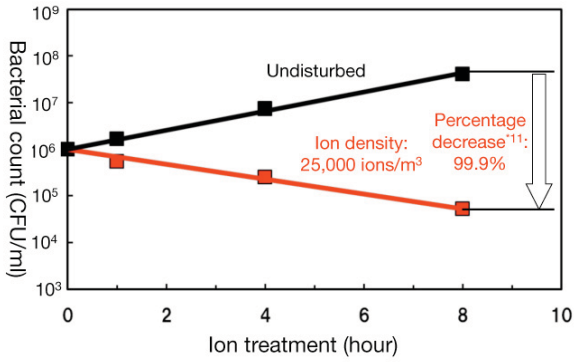
*9 Joint research conducted with Professor Gerhard Artmann, of Aachen University of Applied Sciences.

Method for Proving Effectiveness Against Adherent Methicillin-resistant Staphylococcus aureus (MRSA)

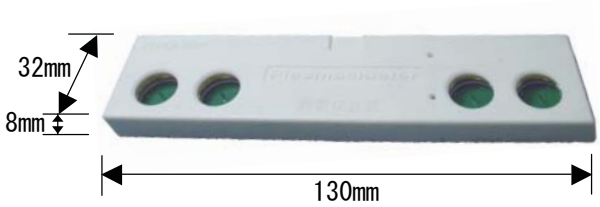
Adherent MRSA bacteria (in the form of an emulsion dripped onto a plastic petri dish) was exposed for a prescribed length of time to Plasmacluster ions generated by a high-density Plasmacluster ion generator at a density of approximately 25,000 ions/cm^3.

After eight hours of exposure, the adherent MRSA bacteria was collected and a study done to count the number of microorganisms using a culture technique[*10] commonly employed in the field of microbiology research. The results confirmed that the number of bacteria decreased by approximately 99.9% compared to the natural state not exposed to Plasmacluster ions.

Change over time in numbers of adherent MRSA



High-Density Plasmacluster Ion Generator



*10 A method of inoculating a medium with bacteria and then studying the number of bacterial colonies that form (bacterial count).

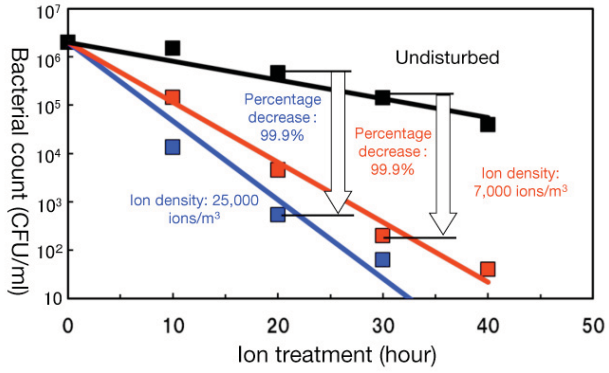
*11 Stated as the percentage of decrease in the bacteria count resulting from exposure to Plasmacluster ions compared to the count of bacteria left undisturbed in their natural state.

Method for Proving Effectiveness Against Airborne Methicillin-resistant Staphylococcus aureus (MRSA), Multidrug-resistant Pseudomonas aeruginosa (MDRP), and Coxsackie Virus

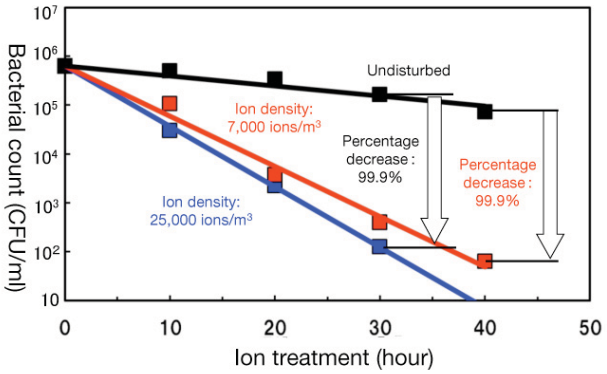
A high-density Plasmacluster ion generator was placed in a box having a volume of 1 m^3. Plasmacluster ions were generated (at densities of 25,000 ions/cm^3 and 7,000 ions/cm^3) and MRSA, MDRP and the Coxsackie virus were separately sprayed in mist form into the box. After a prescribed time, samples of the airborne microorganisms inside the box were collected, and studies were done, in the case of the bacterial substances, using the culture method to obtain a bacterial count, and in the case of the virus, using the $TCID_{50}$ method[*12] commonly used in the virology research field to obtain a measure of infectivity (viral

infectivity titer). The results confirmed that the higher the ion density, the greater the inhibitory effect on the activity of airborne MRSA and MDRP, and on the viral infectivity of airborne Coxsackie virus.

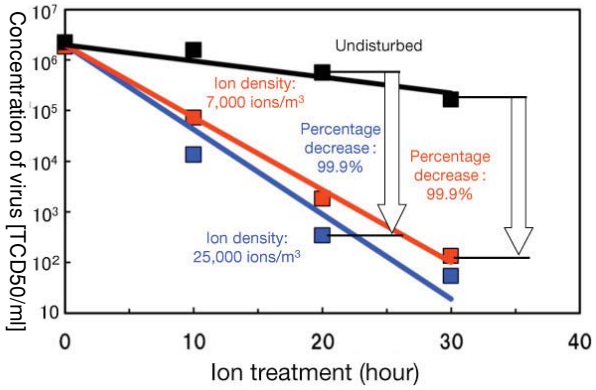
Change over time in bacterial count of airborne MRSA



Change over time in bacterial count of airborne MDRP



Change over time in viral titer of airborne Coxsackie virus



About the Kitasato Institute Medical Center Hospital, Research Division

The Kitasato Institute was founded in 1914 by Dr. Shibasaburo Kitasato to contribute to the improvement of the health of the nation by researching the causes of diseases and approaches to preventative treatments, and by operating medical treatment facilities. The Research Division of the Kitasato Institute Medical Center Hospital is involved in numerous clinical investigations as well as basic research. As part of these programs, a Medical Environmental Science Center was established within the Institute along with construction of hospital rooms specially designed to prevent the spread of infection. The Research Division is engaged in R&D with the goal of improving and enhancing the healthcare environment from a comprehensive perspective.

*12 TCID50 (50% Tissue Culture Infective Dose) method is a test protocol that examines the amount of a virus that will produce pathological change in 50% of cell cultures inoculated with a virus suspension diluted in stepwise increments.