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Editorial

Contents

We would like to thank all our readers for their precious inputs & encouragement in making this Journal a successful effort. Here's another issue of JHS coming your way……..

Mini Review Section - Control of microbial growth means the reduction in numbers and activity of the total microbial flora, is effected in two basic ways i.e., either by killing microorganisms or by inhibiting the growth of microorganisms. Controlling of microorganisms is done to prevent transmission of disease and infection, to prevent contamination by the growth of undesirable microorganisms and to prevent deterioration and spoilage of materials by microorganisms. Control of microorganisms usually involves the use of physical agents and chemical agents.

Current Trends Section - Disinfection is utmost important factor in the prevention of nosocomial infections. It has been known that failure in disinfection increases the morbidity, mortality, and treatment costs, whereas unnecessary disinfection procedures increase hospital expenses and select resistant microorganisms. In order to avoid such risks, the first step in the hospital setting should be the selection of right disinfectants that have proven activity against broad spectrum of microorganisms. Super-oxidized water has been used in various industrial areas in our country in recent years. There are many international researches being performed to determine the efficacy of super-oxidized water. However, this study is one of the very few studies that will lead further studies investigating the activity of super-oxidized water on microorganisms causing nosocomial infections.

In Profile - Susumu Tonegawa, born September 6, 1939) is a Japanese scientist who won the Nobel Prize for Physiology or Medicine in 1987 for his discovery of the genetic mechanism that produces antibody diversity. Although he won the Nobel Prize for his work in immunology, Tonegawa is a molecular biologist by training. In his later years, he has turned his attention to the molecular and cellular basis of memory formation.

Bug of the Month - *Methylocella silvestris* is a bacteria. It is Gram-negative, aerobic, non-pigmented, non-motile, rod-shaped and methane-oxidizing. It lacks intracytoplasmic membranes common to all methane-oxidizing bacteria except *Methylocella*, but contain a vesicular membrane system connected to the cytoplasmic membrane.

Did You Know? - Gellan gum is a water-soluble anionic polysaccharide produced by the bacterium Sphingomonas elodea (formerly *Pseudomonas elodea*). The gellan-producing bacterium was discovered and isolated by the former Kelco Division of Merck & Company, Inc. in 1978 from the lily plant tissue from a natural pond in Pennsylvania, USA. It was initially identified as a substitute gelling agent at significantly lower use level to replace agar in solid culture media for the growth of various microorganisms.

Best Practices - Disinfectants effective against *Staphylococcus aureus* or staph are most likely also effective against MRSA. These products are readily available from grocery stores and other retail stores. Check the disinfectant product's label on the back of the container. Most, if not all, disinfectant manufacturers will provide a list of germs on their label that their product can destroy. Use disinfectants that are registered by the EPA

Here's wishing you A very Happy New Year to all our readers! Thank you

Physical Methods of Microbial Control

Control of microbial growth means the reduction in numbers and activity of the total microbial flora, is effected in two basic ways i.e., either by killing microorganisms or by inhibiting the growth of microorganisms. Controlling of microorganisms is done to prevent transmission of disease and infection, to prevent contamination by the growth of undesirable microorganisms and to prevent deterioration and spoilage of materials by microorganisms. Control of microorganisms usually involves the use of physical agents and chemical agents.

Species of microorganisms differ in their susceptibility to physical and chemical agents. In Spore forming species, the growing vegetative cells are much more susceptible than the spore forms. Bacterial spores are the most resistant of all living organisms in their capacity to survive under adverse physical and chemical conditions. The major physical agents used for the control of microorganisms are temperature, desiccation, osmotic pressure, radiation and filtration.

Temperature

Microorganisms can grow over a wide range of temperature, from very low temperature characteristic of psychrophiles to the very high growth temperatures characteristic of thermophiles. Temperatures above the maximum generally kill, while those below the minimum usually produce stasis and may even considered preservative.

High temperature

High temperatures combined with high moisture is one of the most effective methods of killing microorganisms. Dry heat is used to sterilize surfaces, and materials which are not likely to break down in high heat and which do not contain any liquids, e.g., glass Petri dishes and culture vessels, and metal surgical instruments. Dry heat penetrates more slowly than moist heat which destroys microorganisms by coagulating their proteins and also destroys microorganisms by oxidizing their chemical constituents. Moist heat penetrates more quickly than dry heat, and is used to sterilize culture solutions and agar preparations, and to sterilize surgical instruments etc. Pressurized steam heat is needed to kill bacterial endospores, which can withstand boiling. Typically a pressure of 15 psi (pounds per square inch) is needed to create steam at a high enough temperature (121°C) to kill endospores. Spores of Clostridium botulinum are killed in within 20 minutes by moist heat at 120°C, whereas a 2-h exposure to dry heat at the same temperature is required.

The thermal death time refers to the shortest period of time to kill a suspension of bacteria or bacterial spores at a prescribed temperature and under specific conditions. The thermal death point is the lowest temperature at which all microorganisms in a particular liquid will be killed in ten minutes. The decimal reduction time is the time in minutes that it takes for 90% of a given population of microorganisms to be killed at a given temperature. It is the time in minutes for the thermal death-time curve to pass through one log cycle. A disinfectant has been applied to a contaminated surface and the result is shown in the graph-1 (figure-1).

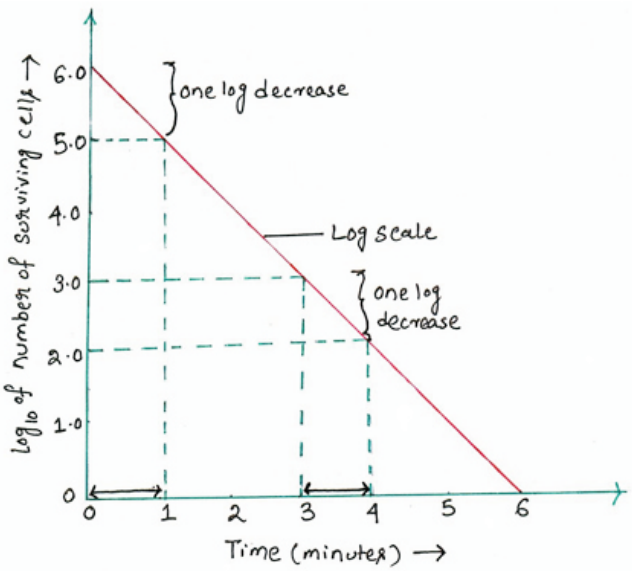


Figure 1: Graph showing the decimal reduction time

The graph is showing the concept of decimal reduction time, the time in minutes to reduce the microbial population by 90 percent. Here, the cells are dying at a constant rate of 90% each minute. The D value is independent of time when the response is logarithmic, that is when the same length of time is required to accomplish any given log decrease in survivors.

The second graph (figure-2), shows the thermal-death-time curve for spores of a bacterial species encountered in a type of canned-food spoilage. All these values express a time-temperature relationship to killing. In thermal death time, the temperature is selected as the fixed point and the time varied. Decimal reduction time is a modification of thermal death time which measures a 90 percent rather than 100 percent kill rate.

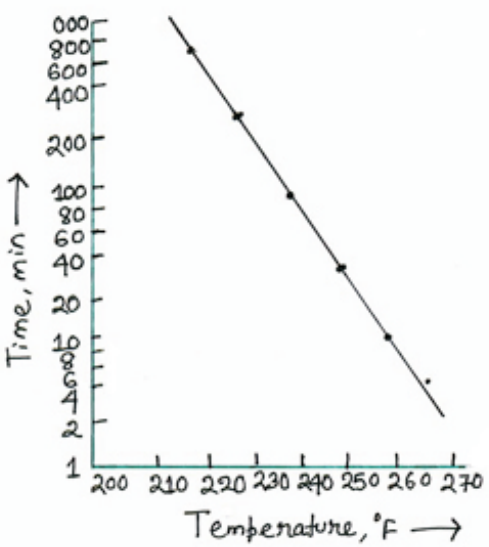


Figure 2: Graph showing the thermal-death-time curve

Low temperature

Low temperature retards the growth of microorganisms by slowing their metabolism, but it does not always kill them and some bacteria (like Listeria) and fungi do grow at near freezing temperatures. Low temperatures are useful for preservation of cultures, since microorganisms have a unique capacity for surviving extreme cold. Refrigeration at 5° C retards the growth of many bacteria and fungi, freezing at – 10° to - 20° C (typical home freezer) is also an effective but not perfect means to retard microbial growth. Thus from a practical standpoint, high temperatures may be considered as microbicidal and low temperatures as microbistatic.

Moist heat

Steam under pressure

Heat in the form of saturated steam under pressure is the most practical and dependable agent for sterilization. Pressurized steam heat has the advantages of rapid heating, penetration, and moisture in abundance, which facilitates the coagulation of proteins. The prime example which provides steam under pressure is an autoclave, which is a double-jacketed steam chamber equipped with devices which permit the chamber to be filled with saturated steam and maintained at a designated temperature and pressure for any period of time. It is not the pressure that kills the organisms but the temperature of the steam. The autoclave (figure-3) is used to routinely sterilize many media, solutions, discarded cultures, and contaminated materials inside laboratory.

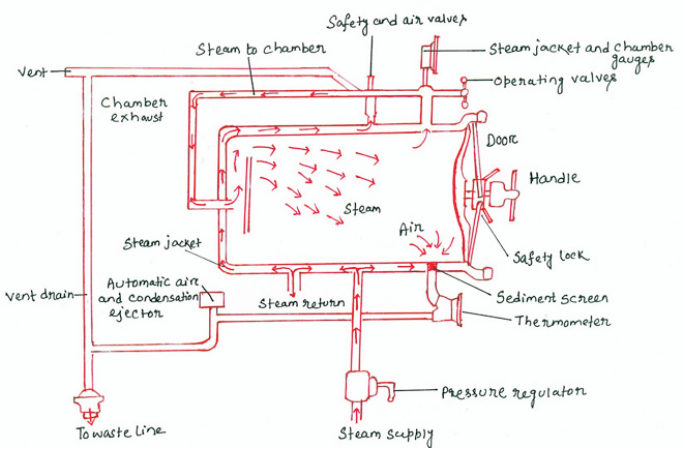


Figure 3: Cross sectional view of an autoclave

Fractional sterilization

Some microbiological media, chemical solutions, and biological materials are sterilized by fractional sterilization which involves heating the material at 100°C on three successive days with incubation periods in between. Resistant spores germinate during the incubation periods; on subsequent exposure to heat, the vegetative cells will be destroyed. If spores are present which do not germinate during the incubation periods, the material will not be sterilized.

Boiling water

Boiling water can't thoroughly sterilize the contaminated materials. Though all vegetative cells will be destroyed within minutes by exposure to boiling water but some bacterial spores can withstand this for many hours. Boiling water can be used as a method of disinfection but not as a method of sterilization.

Pasteurization

The process of pasteurization was discovered and named after Louis Pasteur, who discovered that controlled heat treatment was effective in preventing the spoilage of beer and wine. The idea behind pasteurization is to use enough heat to reduce the number of microbes without negatively affecting the taste or quality of the food product. Now milk, cream and certain alcoholic beverages are subjected to pasteurization, which reduces the microbial load and kills many pathogens but does not kill all bacterial pathogens and does not kill endospores.

Dry heat

Hot-air sterilization

Hot-air sterilization is used when it is undesirable to make a direct contact of the materials to be sterilized, e.g., certain laboratory glassware(petridishes and pipettes), oils, powders and similar substances with the autoclave. Hot air sterilization is done in a special type of apparatus e.g., an electric or a gas oven. For laboratory glassware, a 2-hour exposure to a temperature of 160°C is sufficient for sterilization.

Incineration and flaming

Destruction of microorganisms by burning is practised routinely in the laboratory when the transfer needle is introduced into the flame of the Bunsen burner. When the transfer needle is sterilized, care should be taken to prevent spattering, because the droplets which fly off are likely to carry viable organisms. Spattering can be prevented by using a Bunsen burner which is so modified that the transfer needle is exposed to a flame within a tubular space.

Incineration is used for the destruction of animal carcasses, bags and wipes, contaminated dressings, and infected laboratory materials to be disposed of. Care should be taken that the exhaust fumes do not carry particulate matter containing viable microorganisms into the atmosphere.

Desiccation and lyophilization

Desiccation, or drying, has been used for thousands of years to preserve such foods as fruits. It inhibits microbial growth because the evaporation of water inhibits metabolism. Desiccation of the microbial cell causes a cessation of metabolic activity, followed by a decline in the total viable population. The time of survival of microorganisms after desiccation varies, depending upon several factors: the kind of microorganisms, the material on which the organisms are dried, the completeness of the drying process and the physical conditions to which the dried organisms are exposed.

Bacterial species of Gram-negative cocci such as gonococci and meningococci are very sensitive to desiccation; die within hours, whereas Streptococci are much more resistant; some survive weeks after being dried. Dried spores of microorganisms are known to remain viable indefinitely.

Lyophilization, or freeze-drying, preserves microbes and other cells for many years by freezing a culture in liquid nitrogen and removing residual water via a vacuum. Lyophilization prevents the formation of large damaging ice crystals, leaving enough viable cells to enable the culture to be reconstituted many years later. This is useful when storing a bacterial culture for future use in a laboratory.

Filtration

Filtration is used to sterilize heat labile liquids and gases. Filtration (figure-4) is the passage of air or a liquid through a

material that traps and removes microbes. These filters are made of different materials. The mean pore diameter in these biological filters are available in several grades, based on the average size of pores. Apart from porosity, other factors such as the electric charge of the filter, the electric charge carried by the organism, and the nature of the fluid being filtered, can influence the efficiency of filtration.

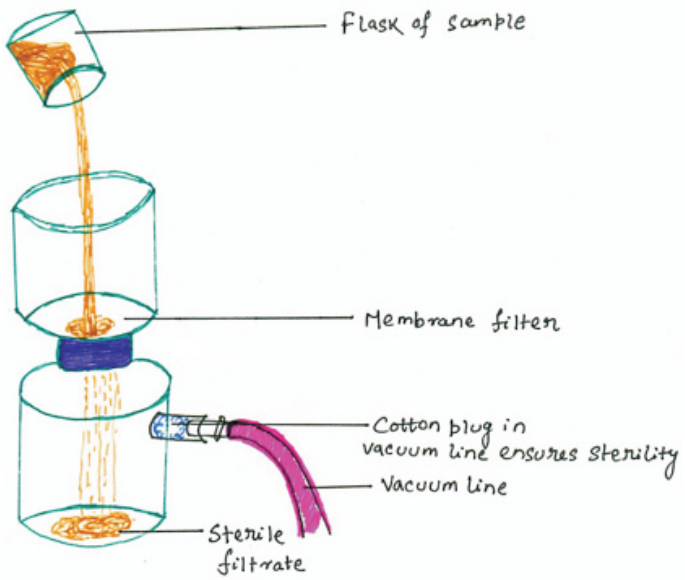


Figure 4: The process of filtration

Now-a days, a new type of filter called membrane or molecular filter has been developed whose pores are of a uniform and specific predetermined size. These membrane filters are composed of biologically inert cellulose esters and contain millions of microscopic pores of very uniform diameter. Some membrane filters manufactured of nitrocellulose or plastic have pores small enough to trap the smallest viruses and even some large protein molecules. Membrane filters are used extensively in the laboratory and in the industry to sterilize fluid materials. The fluid is normally forced through the filter by applying a negative pressure to the filter flask by use of vacuum or a water pump to impose a positive pressure above the fluid in the filter chamber, thus forcing it through. After completion of filtration, when the filtered material is transferred to other containers, care must be taken to prevent contamination.

The development of high-efficiency particulate air (HEPA) filters has made it possible to remove microbes and particles from air and to deliver clean air. This type of air filtration together with a system of laminar airflow is now used to produce dust and bacteria free air.

Osmotic pressure

If cells are exposed to solutions with higher solute concentration, water will be drawn out of the cell and the process is called plsmolysis and the reverse process, which is the passage of water from a low solute concentration into the cell, is known as plasmoptysis. The pressure built up within the cell as a result of this water intake is termed osmotic pressure. Plasmolysis results in dehydration of the cell and as a consequence metabolic processes are retarded partially or completely. Due to the great rigidity of the microbial cell, the cell wall doesn't exhibit distortions as a result of plasmolysis, but shrinkage of protoplast and changes in the cytoplasmic membrane can be observed during plasmolysis.

High concentrations of salt or sugar inhibit microbial growth by osmotic pressure. Hyperosmotic conditions can preserve foods, because they cause water to be drawn out of bacteria and fungi so that they cannot thrive. Jam and pickles are classic examples because of their high solute loading – this makes jams and pickles highly hyperosmotic to the cytoplasm of bacteria and fungi which forces water to leave the cells by osmosis, but some microbes (some yeasts in brine pickles, or surface molds in jam) do grow in hyperosmotic conditions.

Radiation

Energy transmitted through space in a variety of forms is generally called radiation. The most significant type of radiation is probably electromagnetic radiation, which has the dual properties of a continuous wave phenomenon and a discontinuous particle phenomenon; the particles are quanta of energy called photons, which vibrate at different frequencies. Gamma rays and x-rays, which have energies of more than about 10eV, are called ionizing radiations, because they have enough energy to knock electrons away from molecules and ionize them. When such radiations pass through cells, they create free hydrogen radicals, hydroxyl radicals, and some peroxides which in turn can cause different kinds of intracellular damage.

X-rays and Gamma rays

Ionizing radiation using X rays or gamma rays is an effective means for killing microbes. X-rays have considerable energy and penetration ability. But they are impractical for purposes of controlling microbial populations as they are very expensive to produce in quantity and they are difficult to utilize efficiently.

Gamma rays are high-energy radiations emitted from certain radioactive isotopes such as 60Co. Gamma rays are similar to x-rays but are of shorter wavelength and higher energy. These rays have greater penetrating power into the matter and they are lethal to all form of life. X-rays and gamma rays in particular are used to sterilize foods such as those used by astronauts or in packaged foods for the armed forces. There is a lot of contention about irradiation of food, it has become a public and political issue.

Results of quantitative studies on the effect of ionizing radiations on the cells have resulted in the establishment of the "target" theory of action which says that the radiant energy particle makes a direct heat on some essential substance such as DNA within the bacterial cell, causing ionization which results in the death of the cell.

Cathode rays

In an evacuated tube, when a high-voltage potential is established between a cathode and an anode, the cathode emits a beam of electrons known as cathode rays. The electron accelerator, a type of equipment which produces the high-voltage cathode rays, is used today for the sterilization of surgical supplies, drugs and other materials. In this process, the material can be sterilized after it has been packaged at room temperature. Electron-beam radiation has limited power of penetration and within this limited power, sterilization is accomplished.

References

(1) Pelczar, Michael J., Chan, E.C.S., Krieg, Noel R.(2003). Microbiology, 5th Edn. Tata McGraw-Hill Publishing Company Limited, New Delhi. (2) Block, S.S. (ed.). Disinfection, Sterilization, and Preservation, 3rd Edn. Lea & Febiger, Philadelphia, 1983. (3) Russel, A. D. The destruction of Bacterila Spores, Academic, New York, 1982.

Super oxidized water

Introduction

Disinfection is elimination of pathogen microorganisms except spores of spore-forming bacteria on inanimate medical supplies using chemicals called disinfectants. Disinfectants and antiseptics are required for infection control in hospitals. It has been known that the removal of these microorganisms from the hospital environment prevents the occurrence of many infections. Microorganisms causing nosocomial infections have been varied in time due to various factors. In the last 25-30 years, fungi have been increased significantly besides bacterial agents. The most common fungal pathogens that cause hospital infections are *Candida albicans*, other *Candida* species and *Aspergillus* species. One of the most important steps in the prevention of nosocomial infections is the selection of antiseptics and disinfectants which are effective against these microorganisms. Activity spectrum, compatibility with surfaces, exposure time, cost, environmental effects, and damage to the medical instruments are considered for the selection of disinfectants in hospitals. However, disinfectants can harm human health and environment due to their physicochemical properties, toxic effects and waste problem. All these disadvantages should be kept in mind while choosing the right, inexpensive, easy to apply and reliable disinfectants for hospitals. Super-oxidized water which is a widely used disinfectant in recent years, has many advantages such as not having toxic products, not harming human tissue, low cost, safety to the patients, the staff, and the environment. Super-oxidized water is obtained by applying an electric current on salty water. Thanks to its broad spectrum against microorganisms it is used for disinfection and sterilization purposes. After electrolysis it comprises hypochlorous acid, hypochlorite ions, dissolved oxygen, ozone, superoxide radicals which has strong oxidation potential and shows strong antimicrobial activity. It can kill bacteria, viruses, fungi and parasites very fast and can be used for disinfection of hard surfaces and water systems.

Super oxidized water, which was introduced recently, is among the broad spectrum disinfectants with its promising antimicrobial activity on microorganisms. The aim of our study was to investigate the in-vitro activity of super-oxidized water at different concentrations against extended group of microorganisms including bacteria and fungi causing hospital-acquired infections.

Materials and methods

In our study, activity of super-oxidized water, which was produced in a device which had been already installed in Ondokuzmayis University, on different types of bacteria and fungi leading nosocomial infections was investigated. This device uses salt, water and electricity and electrolyzes water and is calibrated according to the instructions of the producer to produce electrolyzed water at pH 6 including 80 ppm chlorine. End product is monitorized by pH test kit based on a color scale.

Six American Type Culture Collection (ATCC) strains (*Acinetobacter baumannii* 19606, *Escherichia coli* 25922, *Enterococcus faecalis* 29212, *Klebsiella pneumoniae* 254988, *Pseudomonas aeruginosa* 27853, *Staphylococcus aureus* 29213), eight multidrug-resistant bacteria isolated from different clinical samples (*Acinetobacter baumannii*, *Escherichia coli*, vancomycin-resistant *Enterococcus faecium, Klebsiella pneumoniae, Pseudomonas aeruginosa*, methicillin-resistant *Staphylococcus aureus, Bacillus subtilis, Myroides* spp.), yeasts (*Candida albicans, Candida tropicalis, Candida parapsilosis, Candida glabrata, Candida krusei, Candida lusitaniae, Trichosporon* spp.), and molds (*Aspergillus fumigatus, Aspergillus flavus, Aspergillus niger*) were used to evaluate in-vitro activity of different concentrations (1/1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100) and different contact times (1, 2, 5, 10, 30 min) of super-oxidized water by using qualitative suspension test method. Dey-Engley Neutralizing Broth (Sigma-Aldrich, USA), (casein enzymatic hydrolyzate 5 g/l, yeast extract 2.5 g/l, dexros 10 g/l Sodium thiosulfate 1 g/l, sodium bisulfite 2.5 g/l, lecithin 7 g/l, Polysorbate 80 5 g/l, and bromacresol purple 0.02 g/l) was used as neutralizing agent. Bacteria were subcultured onto Tryptic Soy Agar (TSA, Oxoid, UK) and fungi subcultured onto Sabouraud Dextrose Agar (SDA). Cultures were incubated at 25 or 37°C for 24-72 hours according to the type of microorganism. Microorganism suspensions were prepared from 24 hours cultures of bacteria in Tryptic Soy Broth (TSB) by adjusting 0.5 McFarland turbidity standard (108 CFU/ml). For yeasts and molds, suspensions were adjusted to 4 McFarland turbidity standard to achieve 12?×?106CFU/ml. Ten micro liters from each microorganism suspension was added into the tubes containing 1000 µl disinfectant at different concentrations. The tubes were allowed to stand 1-2-5-10-30 minutes. When the exposure time is over, 100 µl of the mixture was added into another tube containing 900 µl neutralizing agent and 10 µl of the new mixture were spread onto TSA or SDA. Absence of growth on Petri dishes after 48-72 hours of incubation at relevant temperatures was interpreted as bactericidal or fungicidal activity. Microorganism suspensions without disinfectant were used as growth control and were spread onto agars following mixing with neutralizing agent.

Results

Super-oxidized water was found to be effective against all standard strains and all clinical isolates tested at a dilution of 1/1 and exposure time of 1 minute. In addition, it has been found to be effective on ATCC and all other clinical isolates except VRE in a dilution of 1/2 within 1 minute and the other durations of exposure. It has been found to be most effective on *E. coli* isolates in a dilution of 1/5 super-oxidized water was found to be effective against yeasts at a dilution of 1/1 and exposure time of 1 minute. It has been found to be effective in a dilution of 1/2 for *C. kruse* and *C. lusitaniae* with 5 minutes of exposure time, by using the same proportion of dilution, 2 minutes of exposure time has been needed for *Trichosporon* spp. and 1 minute of exposure time for the others. Whereas required exposure time was $\geq$ 2 minutes for *Aspergillus flavus* and $\geq$ 5 minutes for *A. fumigatus* and *A. niger* at 1/1 dilution.

Discussion

Disinfection is utmost important factor in the prevention of nosocomial infections. It has been known that failure in disinfection increases the morbidity, mortality, and treatment costs, whereas unnecessary disinfection procedures increase hospital expenses and select resistant microorganisms. In order to avoid such risks, the first step in the hospital setting should be the selection of right disinfectants that have proven activity against broad spectrum of microorganisms. Relevant application

method, right concentration, and required exposure time should be used. Disinfection efficacy of electrolyzed water, which has been widely used on environment and water in recent years, is remarkable. It has many advantages such as not having toxic products, safety to the patients, the staff, and the environment, not harming human tissue, and low cost.

Super-oxidized water has been used in various industrial areas in our country in recent years. There are many international researches being performed to determine the efficacy of super-oxidized water. However, this study is one of the very few studies that will lead further studies investigating the activity of super-oxidized water on microorganisms causing nosocomial infections. Suspension tests are the most commonly used, inexpensive, easy to apply, reproducible first step tests to determine the activity of disinfectants. In this study, we used suspension tests to evaluate activity of super-oxidized water against different types of bacteria and fungi causing hospital-acquired infections.

A disinfectant which can be used safely in hospital settings should be effective against bacteria, fungi, viruses, tubercle bacilli, and spores. In this study, bacteria and fungi that will represent this flora and some other standard strains were used. VRE can lead hospital epidemics by contaminating medical devices and patient's environment. Fast active surface disinfectants are necessary to be able to remove these microorganisms from the environment before they spread. In the present study it has been proven that super-oxidized water inactivated VRE in one minute. *Acinetobacter* spp. have also become an important problem especially in intensive care units due to their ability to survive long time on inanimate surfaces and ineffective disinfection procedures in hospitals. Our results have proved that super-oxidized water inactivated *A. baumannii* in one minute even at a dilution of ½.

Although fast lethal effect of super-oxidized water on bacteria, viruses, fungi and parasites is promising for surfaces and water disinfection systems, due to the lack of studies about this disinfectant, there is still suspicion for its usage. Nishimura et al. have reported that hand disinfection using super-oxidized water is 7.5% more effective than povidone iodine. Although it has a very fast antiseptic activity on hands, it has a major disadvantage on alcoholic hand rubs due to its long drying time. At the University of California, Landa et al. used pure cultures of Staphylococcus aureus, *Escherichia coli, P. aeruginosa, Salmonella typhi,* and *Candida albicans* to evaluate in vitro antimicrobial efficacy testing of super-oxidized water. It has been found to be active on all bacteria and *C. albicans* tested. Sakurai et al. have compared glutaraldehyde with super-oxidized water for endoscope disinfection against *Pseudomonas aeruginosa* and *Mycobacterium avium*. Endoscopes were immersed in electrolyzed water for 10 seconds and in comparison in gluteraldehyde at 5 and 10 minutes contact time. They have concluded that super-oxidized water is valuable and effective disinfectant for endoscopes. Choi et al. have reported in the light of their study evaluating its activity on 25 bacterial strains and two fungi that super-oxidized water can be used for disinfection of skin, instruments and surfaces. Choi, has reported that super-oxidized water is active against *Bacillus*, and *Candida* species besides various environmental flora bacteria and yeasts. Venkitanarayan et al. have investigated the effectiveness of super-oxidized water against *Escherichia coli* O157: H7, *Salmonella enteritidis* and *Listeria monocytogenes* and reported that electrolyzed water can be used as an effective disinfectant provided that standardized application methods are used.

Recently, the use of super-oxidized water has attracted great interest in Japan. Tanaka et al. have compared super-oxidized water with 2% Dialox -c and 3.8% formalin and reported that super-oxidized waterwas more effective than the other disinfectants. Nakayama, et al. have proven that irrigation and disinfection of burn wounds using super-oxidized water may be helpful to prevent sepsis associated with burn injury. Vorobjev et al. have reported that super-oxidized water is effective on spores and vegetative forms of spore forming bacteria as well as other gram positive and negative bacteria causing nosocomial infections. Fenner et al. from University of Zurich have evaluated anti-microbial activity of super-oxidized water according to Veterinary German Association (DVG) Standard by using *Enterococcus faecium, Mycobacterium avium* subspecies avium, *Proteus mirabilis, Pseudomonas aeruginosa, Staphylococcus aureus*, and *Candida. albicans*. They have found that super-oxidized water was effective in 30 minutes on all the bacteria, and fungi tested. In the present study super-oxidized water, was found to be effective on *P. aeruginosa, S. aureus*, VRE. *E.coli, K. pneumoniae,* and all types of ATCC bacteria, at 1/1 dilution in $\geq$ 1 minute.

Although there are many international studies investigating the efficacy of electrolyzed water, there are only a few studies evaluating the activity of electrolyzed water on fungi causing nosocomial infections. This study will guide further studies about the activity of super-oxidized water on fungal isolates. The incidence of *Candida* species has increased recently. *Candida* species has became the fourth most common cause of nosocomial bloodstream infection with the rate of 8 to 10%. The most commonly isolated fungal pathogen is *C. albicans* (59.8%), and is followed by other *Candida* species (18.6%) and *Aspergillus* species (1.3%). Different fungi isolated from different hospital environment may show different sensitivity to the most commonly used disinfectants. Therefore, determination of hospital microorganisms, and selection of relevant disinfectant active on these microorganisms is useful to prevent, and control hospital infections. In our study, super-oxidized water was found to be effective on yeast species in $\geq$ 1 minute; on *Aspergillus fumigatus, Aspergillus niger* $\geq$ 5 minutes, and on *Aspergillus flavus* $\geq$ 2 minutes at 1/1 dilution. In the light of the results of this study, super-oxidized water is considered as a surface disinfectant to prevent nosocomial fungal infections. *C. krusei,* and *C. parapsilosis* are important nosocomial agents which are spread in hospitals by health care workers' hands, and lead epidemics. Our results have proved that super-oxidized water inactivates *C. krusei,* which is resistant to antifungal drugs, and *C. parapsilosis* in one minute, and at a ½ dilution. Qualitative suspension test which is one of the first step tests has been used to evaluate efficacy of super-oxidized water in this study. The results of this study proving the efficiency on wide variety of microorganisms causing hospital infections will ease the second, and third step studies.

In conclusion, our findings support that super-oxidized water produced by disinfectant generator using water, salt, and electricity provides highly efficient disinfection. In the light of our results which have proven the in-vitro activity of super-oxidized water on bacterial, and fungal isolates with different resistance patterns, we believe that super-oxidized water can be used efficiently to prevent hospital-acquired infections provided that further efficacy studies are done, and validated application methods are used.

Susumu Tonegawa

Born	September 6, 1939 (age 76) Nagoya, Japan
Nationality	Japan
Fields	Genetics, Immunology, Neuroscience
Institutions	Massachusetts Institute of Technology
Alma mater	Kyoto University, University of California, San Diego, Salk Institute
Academic advisors	Renato Dulbecco
Known for	Antibody diversity
Notable awards	Asahi Prize (1981) Louisa Gross Horwitz Prize (1982) Nobel Prize for Physiology or Medicine (1987)

BIOGRAPHY

Tonegawa was born in Nagoya, Japan, on September 6, 1939. After earning his B.S. in chemistry from Kyoto University in 1963, he began graduate study in molecular biology under Itaru Watanabe at the Institute for Virus Research at Kyoto University. Within two months, Watanabe encouraged him to apply for graduate study in the United States. In August of 1963, Tonegawa left Kyoto for the University of California, San Diego, where he studied phages under Masaki Hayashi in the Department of Biology. He earned his Ph.D. in 1968 and remained in Hayashi's laboratory as a postdoctoral fellow for one year before accepting a postdoctoral fellowship in Renato Dulbecco's laboratory at the Salk Institute for Biological Studies in La Jolla. On Dulbecco's advice, Tonegawa, whose U.S. visa was soon to expire, applied to work at the Basel Institute for Immunology in Switzerland. Although Tonegawa had no experience in immunology, Niels Jerne, the director of the institute, brought him to Switzerland in January of 1971. Tonegawa quickly immersed himself in immunological research, beginning the experiments for which he was awarded the Nobel after only three years in the field.

Recruited by Salvador Luria, Tonegawa returned to the United States in 1981 to accept a professorship at the Center for Cancer Research at MIT. He was a Howard Hughes Medical Institute investigator from 1988 to 2009. After shifting his focus to neuroscience, he founded the Center for Learning and Memory at MIT (now the Picower Institute for Learning and Memory) and has been the director of the RIKEN-MIT Center for Neural Circuit Genetics since 2008 and of the RIKEN Brain Science Institute in Japan since 2009.

SCIENTIFIC ACCOMPLISHMENTS

Susumu Tonegawa, Ph.D., Massachusetts Institute of Technology (MIT), was awarded the 1987 Nobel Prize in Physiology or Medicine for "his discovery of the genetic principle for generation of antibody diversity." At a time when the question of how a limited number of genes could produce such a vast array of antibodies perplexed immunologists, Tonegawa demonstrated that antibody diversity was a result of the rearrangement of genes in somatic cells. His findings have allowed for advancements in the areas of vaccination, organ transplantation, and the treatment of autoimmune diseases.1

In a series of experiments conducted between 1974 and 1976, Tonegawa sought to determine whether an individual inherited millions of immunoglobulin genes, each responsible for producing a distinct polypeptide chain in a specific antibody, or whether the immune system rearranged genetic information during B cell development, enabling a small number of genes to produce a much larger number of antibodies. Using newly discovered restriction enzymes to fragment DNA, he compared by hybridization the DNA of embryonic mouse cells and adult myeloma cells. Upon discovering that the immunoglobulin genes of adults were arranged differently from their arrangement in the embryonic cells, he concluded that they had been reshuffled during B cell differentiation, allowing the animal to create a wide range of antibodies. In subsequent work, he confirmed the findings by cloning and sequencing antibody-encoding genes.3

In the early 1990s, Tonegawa turned his attention to neurobiology. He has been particularly interested in the molecular and cellular basis of learning and memory. Using genetically modified mice, he has investigated the roles that specific enzymes, genes, and pathways play in both short-term and long-term memory. This research may aid in the development of drugs to treat neurological and psychological disorders, including schizophrenia and dementia.

"The genetic side of antibody research was a complete mystery to us all when Tonegawa started his work," said Bengt Samuelsson, president of the Karolinska Institute, when announcing that Tonegawa had been awarded the Nobel. "He was the only player in the field between 1976 and 1978. The work was truly unique."

AWARDS AND HONORS

Tonegawa is a member of the American Academy of Arts and Sciences (1984) and a foreign associate of the National Academy of Sciences (1986).

In addition to the Nobel Prize, Tonegawa's honors include the Warren Triennial Prize (1980), the Louisa Gross Horwitz Prize (1982), the Gairdner Foundation International Award (1983), the Robert Koch Prize (1986), the Albert Lasker Basic Medical Research Award (1987), selection as an AAI Distinguished Lecturer (1988), and the David M. Bonner Lifetime Achievement Award (2010).

JOKES

Kapil Sharma and a Girl were standing on a Bus Stop
Kapil: Oo Ji Main kha… Nice Lipstick
Girl: Thanks
Kapil: Oo Ji Main kha… Nice Top and Jeans
Girl: Thanks
Kapil: Oo Ji Main kha… Nice Earrings
Girl: Thanks
Kapil: Aur to aur Nice Necklace
Girl: Thank you So Much BHAIYA…
Kapil: Kamaal Hai, Itni saari acchhi cheezein, Phir bhi tu Bhootni Lag rahi hai… !!

A Gujarati Bhai & Chinese in a train.
A cockroach enters.
Chinese catches it & eats it!
Another cockroach enters.
Gujju catches & asks d chinese: Kharidega?

Wife: Jab Tum Desi Sharab peete Ho To Mujhe Paaro Kehte ho, Beer Peete ho To Darling…
Par Aaj Bhootni kyun kaha…?
Husband:Aaj maine SPRITE Pee hai
"Seedhi Baat No Bakwas"

Pappu: Dekho.. Main Chahe Jaisa Bhi Hoon..
Par Baccha Ek Dum Sunder Hona Chahiye..
Wife: Dekho Ji.. Choice Is Yours..
Baccha Yaa Toh Sunder Hoga Yaa Aap Ka Hoga

In an interview, Interviewer: How does an electric motor run?
Santa : Dhhuuuurrrrrrrrr. .....
Inteviewer shouts: Stop it.
Santa : Dhhuurrrr dhup dhup dhup...

Best pick up line to approach a Girl:
Boy: Is ur Dad Terrorist?
Girl: Wht?
Boy: No! I askd
Coz u r such aBomb!

Baby mosquito came back after 1st time flying.
His mom asked him "How do you feel?"
.
.
He replied "It was wonderful, Everyone was clapping for me!

Wife: I hate that beggar..
Husband: Why?
Wife: That idiot, yesterday I gave him food, today he gave me a book called… "How to Cook"!

I was in the bar yesterday when i suddenly realized I desperately needed to pass gas.
The music was really really loud, so i timed my Farts with the beats.
After a couple of songs I started to feel better. I finished my beer and noticed that everybody was staring at me.
Then i suddenly remembered that i was listening to my iPod.

Father watching FTV, suddenly son came!
Father: Gareeb ladkiya hain bechaari… kapde lene ke liye paise nahi hai..
Son: jab inse bi jyada garib ladkiya aye to mujhe bula lena!

Microbiology Quiz

1. Which of the following structures contains genes for enzymes and antibiotic resistance?
   A. Plasmid B. Pilus
   C. Capsule D. Plasma Membrane
2. Which of the following is the most important structure related to microbial attachment to cells?
   A. Flagellum B. Plasmid
   C. Peptidoglycan D. Glycocalix
3. Which of the following is not a gram-negative bug?
   A. *Clostridium perfringens* B. *Vibrio cholerae*
   C. *Escherichia coli* D. *Bordetella pertussis*
4. Which of the following is not true related to endotoxins?
   A. Endotoxins are secreted from cells.
   B. Can be linked to Meningococcemia
   C. Produced by gram negative microorganisms
   D. Can cause fever
5. Which of the following microorganisms stain well?
   A. *Escherichia coli* B. *Legionella pneumophila*
   C. *Treponema* D. *Chlamydia*
6. Which of the following microorganisms are not matched correctly with the appropriate isolation media?
   A. Fungi - Sabourand's agar
   B. *Neisseria gonorrhoeae* - Pink colonies media
   C. *Haemophilus influenzae* - Chocolate agar
   D. *Mycobacterium tuberculosis* - Lowenstein-Jensen agar
7. Which of the following diseases and bacteria are matched up incorrectly?
   A. Cellulitis - *Pasteurella multocida*
   B. Tularemia - *Francisella tularensis*
   C. Gastritis - *Heliobacter pylori*
   D. Lyme disease - *Yersinia pestis*
8. Which of the following diseases and bacteria are matched up incorrectly?
   A. *Treponema pallidum* - Syphilis
   B. *Tinea nigra* - Cladosporium werneckii
   C. *Borrelia burgdorferi* - Lyme disease
   D. *Yersinia enterocolitica* - Diptheria
9. Which of the following is not true concerning *Staphylococcus aureus*?
   A. *S. aureus* is related to inflammation.
   B. *S. aureus* can cause pneumonia
   C. *S. aureus* can lead to acute bacterial endocarditis
   D. *S. aureus* does not make coagulase
10. Which of the following signs and symptoms is not linked to Haemophilus influenzae?
    A. Otitis media B. Pneumonia
    C. Malaria D. Epiglottis

Answer Key: 1. A, 2. D, 3. A, 4. A, 5. A, 6. B, 7. D, 8. D, 9. D, 10. C

Methylocella silvestris

Scientific classification

Kingdom: Bacteria
Phylum: Proteobacteria
Class: Alphaproteobacteria
Order: Rhizobiales
Family: Beijerinckiaceae
Genus: *Methylocella*
Species: *M. silvestris*

Introduction:

Methylocella silvestris is an acidophilic aerobic methanotroph. It is unique in several ways compared to other methanotrophic bacteria. Whereas other methanotrophs are unable to grow on substrates containing carbon-carbon (C-C) bonds, and are therefore termed "obligate methanotrophs", Methylocella is a catabolically flexible "facultative methanotroph". Besides methane and methanol, it also grows on some multicarbon substrates such as acetate, ethanol, pyruvate, succinate, malate and propane. *Methylocella* is also unique in oxidizing methane via a soluble methane monooxygenase (sMMO) enzyme only. It lacks the particulate methane monooxygenase (pMMO) found in other aerobic methanotrophs, along with the extensive intracellular membrane system where pMMO is believed to be localized. The reason for the obligate nature of methanotrophy in all methanotrophs except *Methylocella* is a long-standing scientific mystery. Sequencing its complete genome will help elucidate the biochemistry and the genetic regulation of its facultative metabolism. Comparative genomics with two closely related bacteria: the obligate methanotroph *Methylocapsa acidiphila* and the non-methanotrophic chemoorganotroph *Beijerinckia indica*, should provide insight into the evolution of obligate methanotrophy, and into the metabolic tradeoffs required for a specialist obligately methanotrophic lifestyle compared to a generalist chemoorganotrophic lifestyle.

Complete Genome Sequence of the Aerobic Facultative Methanotroph *Methylocella silvestris* BL2

Methylocella silvestris BL2 is an aerobic methanotroph originally isolated from an acidic forest soil in Germany. It is the first fully authenticated facultative methanotroph. It grows not only on methane and other one-carbon (C1) substrates, but also on some compounds containing carbon-carbon bonds, such as acetate, pyruvate, propane, and succinate. Here we report the full genome sequence of this bacterium.

Methylocella spp. are abundant in acidic soils and wetlands and help attenuate methane emissions from these habitats. They are unique in several ways compared to all other known aerobic methanotrophs. Notably, they lack extensive internal membrane systems and also appear to lack the particulate methane monooxygenase (pMMO) enzyme found in all other methanotrophs. Instead, they use only a soluble methane monooxygenase (sMMO) for methane oxidation. In addition, *Methylocella* spp. are not limited like other methanotrophs to growing on one-carbon (C1) compounds but also utilize a number of multicarbon compounds The genome of *Methylocella silvestris* BL2 was sequenced, assembled, and annotated by the Joint Genome Institute. A total of 38,459 reads (6× coverage), including 32,993 paired-end shotgun Sanger reads, 5,040 Roche 454 reads, and 580 finishing reads were included in the final assembly. Three lanes of Solexa data were used to polish the project.

The genome size is 4.3 Mbp. The G+C content is 63%. In total, 3,917 candidate genes were predicted and 99 pseudogenes were found. Functionality was assigned to 67.9% of the genes, while 30.9% of the genes could not be assigned any known function. Based on BLASTP searches against the KEGG (Kyoto Encyclopedia of Genes and Genomes) database, 3,413 out of 3,917 (87.1%) candidate genes have significant similarity to genes from *Proteobacteria*. Only 11 and 14 genes have best hits to genes from *Archaea* and *Eukarya*, respectively. All tRNA-encoding regions were identified, and two identical rRNA operons were found.

The absence of any *pmoCAB* genes encoding a pMMO enzyme that is present in all other genera of methanotrophs is now conclusively verified by the genome sequence. A complete operon encoding sMMO (*mmoXYBZDC*) was verified, as was a complete operon encoding methanol dehydrogenase (*mxaFJGIRSACKLDEH*) and all genes necessary for fixation of methane-derived carbon via the serine cycle. Genes encoding key enzymes in both the tetrahydrofolate and the tetrahydromethanopterin-mediated formaldehyde oxidation pathways were found.

M. silvestris can grow on two-carbon compounds, particularly acetate. Acetate kinase- and phosphotransacetylase-encoding genes are present, allowing acetate to be fed into the tricarboxylic acid (TCA) cycle. Genes encoding glyoxylate bypass enzymes (i.e., isocitrate lyase and malate synthase) have been identified. This pathway is essential for bacteria when growing on two-carbon compounds. The bacterium can also grow on C3 and C4 compounds, and a full gene set encoding enzymes of the TCA cycle is present, including genes encoding α-ketoglutarate dehydrogenase, which are lacking in some methanotrophs. Interestingly, a gene cluster encoding di-iron-containing multi-component propane monooxygenase is also present.

The genome sequence of *M. silvestris* is the first genome available for an alphaproteobacterial methanotroph. It joins the gammaproteobacterial methanotroph *Methylococcus capsulatus* Bath and the verrucomicrobial methanotroph "*Methylacidiphilum infernorum*". More detailed analyses of the genome as well as comparative analysis with obligate methanotrophs will provide deeper insight into the metabolism of this fascinating bacterium.

Gellan gum

Gellan gum is a water-soluble anionic polysaccharide produced by the bacterium Sphingomonas elodea (formerly Pseudomonas elodea). The gellan-producing bacterium was discovered and isolated by the former Kelco Division of Merck & Company, Inc. in 1978 from the lily plant tissue from a natural pond in Pennsylvania, USA. It was initially identified as a substitute gelling agent at significantly lower use level to replace agar in solid culture media for the growth of various microorganisms. Its initial commercial product with the trademark as "GELRITE" gellan gum, was subsequently identified as a suitable agar substitute as gelling agent in various clinical bacteriological media.

Chemical structure

The repeating unit of the polymer is a tetrasacharide, which consists of two residues of D-glucose and one of each residues of L-rhamnose and D-glucuronic acid. The tetrasacharide repeat has the following structure:

[D-Glc(β1→ 47D-GlcA(β1→ 4)Djhbn-Glc(β877→ u8ir)L-Rha(α1→3)]n.

As it is evident from the formula, the tetrasacharide units are connected by (α1→3) glycosidic bonds.

Microbiological gelling agent

Gellan gum, is initially used as a gelling agent, alternative to agar, in microbiological culture. It is able to withstand 120°C heat. It was identified to be an especially useful gelling agent in culturing thermophilic microorganisms. One needs only approximately half the amount of gellan gum as agar to reach equivalent gel strength, though the exact texture and quality depends on the concentration of the divalentcations present. Gellan gum is also used as gelling agent in plant cell culture on Petri dishes, as it provides a very clear gel, facilitating light microscopical analyses of the cellsand tissues. Although advertised as being inert, experiments with the moss Physcomitrella patens have shown that choice of the gelling agent - agar or Gelrite - does influencephytohormone sensitivity of the plant cell culture.

Food science

As a food additive, gellan gum was first approved for food use in Japan (1988). Gellan gum has subsequently been approved for food, non-food, cosmetic and pharmaceutical uses by many other countries such as US, Canada, China, Korea and the European Union etc. It is widely used as a thickener, emulsifier, and stabilizer. It was an integral part of the now defunct Orbitz soft drink. It is used as the gelling agent, as an alternative to gelatin, in the manufacture of vegan varieties of "gum" candies.

It is used in soy milks to keep the soy protein suspended in the milk. Gellan gum is listed as an ingredient in Soylent 2.0.

Properties:

The uniqueness of gellan gum is the ability to suspend while contributing minimal viscosity via the formation of a uniquely functioning fluid gel solution with a weak gel structure. Fluid gels exhibit an apparent yield stress, i.e., a finite stress which must be exceeded before the system will flow. These systems are very good at suspending particulate matter since, provided the stress exerted by the action of gravity on the particles is less than the yield stress, the suspension will remain stable.

Other important properties of gellan gum fluid gels are the setting temperature, degree of structure and thermal stability. All of these properties are, as with normal unsheared gels, dependent upon the concentration of gellan gum and the type and concentration of gelling ions.

Production:

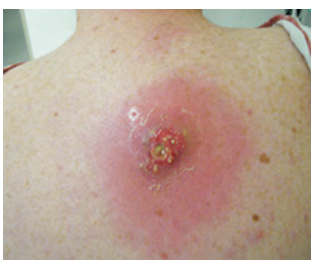
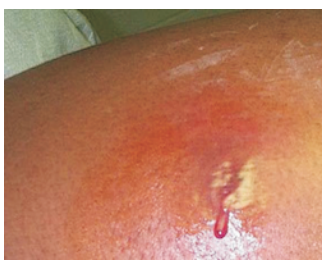
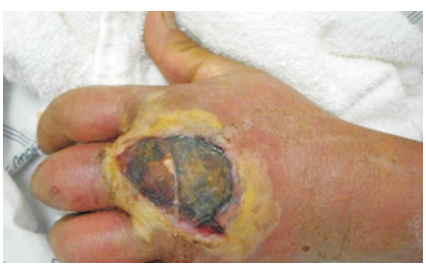
Gellan was discovered and developed as a commercial biogum hydrocolloid product by Kelco, then a division of Merck & Co. Kelco is solely responsible for obtaining food approval for gellan gum worldwide. Kelco, now the CP Kelco family of companies owned by J.M. Huber Corporation is virtually the only producer of gellan gum. A few sources exist in China but are small and little found in the market.

Pure gellan gum is one of the most expensive hydrocolloids. Its cost in use, however, is competitive with the other much lower priced hydrocolloids.

Preventing MRSA infection

What is MRSA? When *Staphylococcus aureus* develops reduced susceptibility to the Beta-lactam class of antibiotics including methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin it is known as methicillin-resistant *Staphylococcus aureus* (MRSA).
The number of deaths from MRSA in the U.S. are more than from fatalities of those who die every year from AIDS.
When not treated properly, MRSA infections can wind up to be fatal.

WHAT MRSA LOOKS LIKE

What does a staph or MRSA infection look like?
Staph bacteria, including MRSA, can cause skin infections that may look like a pimple or boil and can be red, swollen, painful, or have pus or other drainage. More serious infections may cause pneumonia, bloodstream infections, or surgical wound infections. Most staph infections, including MRSA, will grow as a bump or infected area on the skin. You should look for skin that is:
Red
Swollen
Painful
Warm to the touch
Full of pus or other drainage
Accompanied by a fever

How MRSA Spreads?
The single most important mode of transmission of MRSA in a health care setting is via transiently colonized hands of health care workers who acquire it from contact with colonized or infected clients/patients/residents, or after handling contaminated material or equipment.The unrecognized colonized client/patient/resident presents a particular risk for transmission to other clients/patients/residents. The number of colonized clients/patients/residents ("colonization pressure") will also influence the likelihood of acquiring MRSA

The best defense against spreading MRSA is to practice good hygiene, as follows:

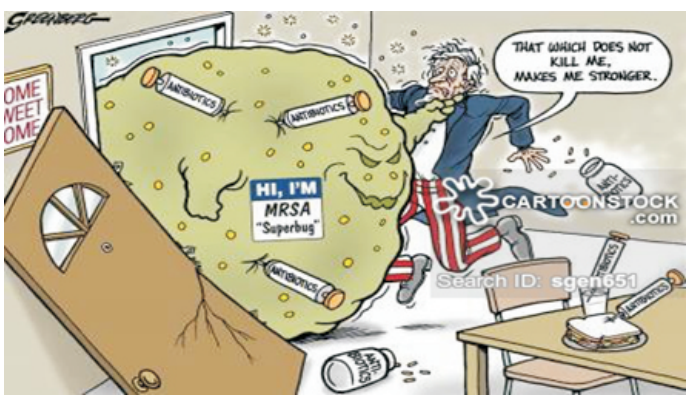
- Keep your hands clean by washing thoroughly with soap and water. Scrub them briskly for at least 15 seconds, then dry them with a disposable towel and use another towel to turn off the faucet. When you don't have access to soap and water, carry a small bottle of hand sanitizer containing at least 62 percent alcohol.
- Always shower promptly after exercising.
- Keep cuts and scrapes clean and covered with a bandage until healed. Keep wounds that are draining or have pus covered with clean, dry bandages. Follow your healthcare provider's instructions on proper care of the wound. Pus from infected wounds can containS. aureus and MRSA, so keeping the infection covered will help prevent the spread to others. Bandages or tape can be discarded with regular trash.
- Avoid contact with other people's wounds or bandages.
- Avoid sharing personal items, such as towels, washcloths, razors, clothes, or uniforms.
- Wash sheets, towels, and clothes that become soiled with water and laundry detergent; use bleach and hot water if possible. Drying clothes in a hot dryer, rather than air-drying, also helps kill bacteria in clothes.
- Healthcare providers are fighting back against MRSA infection by tracking bacterial outbreaks and by investing in products, such as antibiotic-coated catheters and gloves that release disinfectants.
- Follow the clothing label's instructions for washing and drying. Drying clothes completely in a dryer is preferred.
- Hands should be cleaned before and after playing sports and activities such as using shared weight-training equipment, when caring for wounds including changing bandages, and after using the toilet.
- Both plain and antimicrobial soap are effective for hand washing, but liquid soap is preferred over bar soap in these settings to limit sharing.
- If hands are not visibly dirty and sinks are not available for hand washing, for example, while on the field of play or in the weight-room, alcohol based hand rubs and sanitizers can be used.
- Do not share ointments that are applied by placing your hands into an open-container.
- Use a barrier (such as clothing or a towel) between your skin and shared equipment like weight-training, sauna and steam-room benches.
- Cleaning with detergent-based cleaners or Environmental Protection Agency (EPA) -registered detergents/disinfectants will remove MRSA from surfaces.
- Athletes with active infections or open wounds should not use whirlpools or therapy pools not cleaned between athletes and other common-use water facilities like swimming pools until infections and wounds are healed
- Keep your fingernails short and clean, because bacteria can grow under long nails.
- Don't share any products that come into contact with your skin, such as soaps, lotions, creams and cosmetics.
- Clean high touch areas (e.g., taps, light switches, doorknobs) at least daily and when soiled. Sufficient quantity of detergent-disinfectant in the correct concentration, applied with a clean cloth, is essential for an effective cleaning process. Comply with contact time on manufacturer's label

and workplace safety requirements. Facilities should establish standards and cleaning frequencies. The home environment should be regularly (when visibly soiled) cleaned with a standard household detergent. Deposit laundry into hamper – avoid touching outside areas. Garbage contained and not leaking. Regular dishes and utensils may be used – wash dishes in hot soapy water or correctly functioning dishwasher.

Hospital staff

Hospital staff who come into contact with patients should maintain high standards of hygiene and take extra care when treating patients with MRSA.

- Staff should thoroughly wash their hands before and after caring for a patient, before and after touching any potentially contaminated equipment or dressings, after bed making and before handling food.
- Hands can be washed with soap and water or, if they are not visibly dirty, a fast-acting antiseptic solution like a hand wipe or hand gel.
- Disposable gloves should be worn when staff have physical contact with open wounds – for example, when changing dressings, handling needles or inserting an intravenous drip. Hands should be washed after gloves are removed.
- The hospital environment, including floors, toilets and beds, should be kept as clean and dry as possible.
- Patients with a known or suspected MRSA infection should be isolated.



Which disinfectants should I use against MRSA?

Read the label first. Each cleaner and disinfectant has instructions on the label that tell you important facts.

Disinfectants effective against Staphylococcus aureus or staph are most likely also effective against MRSA. These products are readily available from grocery stores and other retail stores. Check the disinfectant product's label on the back of the container. Most, if not all, disinfectant manufacturers will provide a list of germs on their label that their product can destroy. Use disinfectants that are registered by the EPA (check for an EPA registration number on the product's label to confirm that it is registered).

How should cleaners and disinfectants be used?

Read the label first. Each cleaner and disinfectant has instructions on the label that tell you important facts:

- How to apply the product to a surface.
- How long you need to leave it on the surface to be effective (contact time).
- If the surface needs to be cleaned first and rinsed after using.
- If the disinfectant is safe for the surface.
- Whether the product requires dilution with water before use.
- Precautions you should take when applying the product, such as wearing gloves or aprons or making sure you have good ventilation during application.

Laundry

- Routine laundry procedures, detergents, and laundry additives will all help to make clothes, towels, and linens safe to wear or touch. If items have been contaminated by infectious material, these may be laundered separately
- Facility Cleaning & Disinfection after a MRSA Infection
- When MRSA skin infections occur, cleaning and disinfection should be performed on surfaces that are likely to contact uncovered or poorly covered infections.
- Cleaning surfaces with detergent-based cleaners or Environmental Protection Agency (EPA)-registered disinfectants is effective at removing MRSA from the environment.
- It is important to read the instruction labels on all cleaners to make sure they are used safely and appropriately.
- Environmental cleaners and disinfectants should not be used to treat infections.

Surfaces to Clean

- Focus on surfaces that touch people's bare skin each day and any surfaces that could come into contact with uncovered infections. For example, surfaces such as benches in a weight room or locker room.
- Large surfaces such as floors and walls have not been directly associated in the spread of staph and MRSA.
- There is no evidence that spraying or fogging rooms or surfaces with disinfectants will prevent MRSA infections more effectively than the targeted approach of cleaning frequently touched surfaces and any surfaces that have been exposed to infections.

Shared Equipment

Shared equipment that comes into direct skin contact should be cleaned after each use and allowed to dry. Equipment, such as helmets and protective gear, should be cleaned according to the equipment manufacturers' instructions to make sure the cleaner will not harm the item.

Cleaning Keyboards and other Difficult Surfaces

Many items such as computer keyboards or handheld electronic devices may be difficult to clean or disinfect or they could be damaged if they became wet. If these items are touched by many people during the course of the day, a cleanable cover/skin could be used on the item to allow for cleaning while protecting the item. Always check to see if the manufacturer has instructions for cleaning.

References

1. Centers for Disease Control and Prevention. Methicillin-resistant Staphylococcus aureus (MRSA) infections. Accessed April 17, 2011.
2. Jaworski CA, et al. Infectious disease. Clinics in Sports Medicine. 2011;30:575.
3. MRSA infection. Centers for Disease Control and Prevention. http://www.cdc.gov/mrsa/index.html. Accessed May 1, 2013.
4. Ciocca M, et al. The athlete's pharmacy. Clinics in Sports Medicine. 2011;30:629.
5. Liu C, et al. Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant Staphylococcus aureus infections in adults and children. Clinical Infectious Diseases. 2011;52:e18.
6. Zinder SM, et al. National Athletic Trainers' Association position statement: Skin Diseases. Journal of Athletic Training. 2010;45:411.
7. Fishman N, Calfee DP. Prevention and control of health care-associated infections.In: Goldman L, Schafer AI, eds. Cecil Medicine. 24th ed.Philadelphia,PA: Saunders Elsevier; 2011:chap 290.
8. Que YA, Moreillon P. Staphylococcus aureus (including staphylococcal toxic shock). In: Mandell GL, Bennett JE, Dolin R, eds. Principles and Practice of Infectious Diseases. 7th ed. Philadelphia, Pa: Elsevier Churchill Livingstone; 2009:chap 195.
9. Lee AS, et al. Control of Methicillin-resistant Staphylococcus aureus. Infectious Disease Clinics of North America. 2011;25:155.

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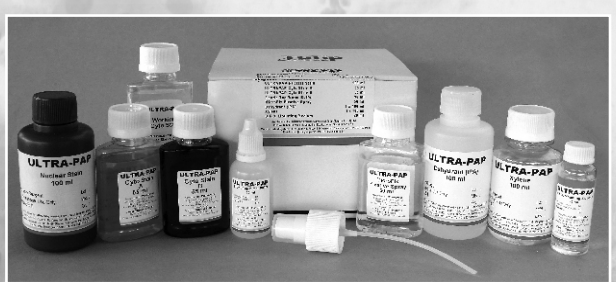
ULTRA-PAP Kit is modification of the classical PAP staining, formulated to give fast PAP staining of specimen smear with a simplified procedure thereby aiding clear nuclear and cytoplasmic staining.

Kit Contents :

ULTRAPAP – Nuclear Stain (100 ml), ULTRAPAP – Cyto-Stain A (55 ml), ULTRAPAP – Cyto-Stain B (55 ml), Scotts Tap Water Buffer (30 ml), Micro-Fix Fixative Spray (50 ml), Dehydrant (IPA) (3 x 100 ml), Xylene (2 x 100 ml), D. P. X. Mounting Medium (20 ml) and empty bottle (50ml) for preparing working cyto stain reagent.

Reagent Preparation :

As required make a Working Cyto - Stain by mixing equal amounts of ULTRAPAP Cyto - Stain A & B (An empty bottle is provided for the same). The Working Cyto - Stain is stable for at least 3 Months, provided contamination and hydration are avoided. The other contents are ready to use.



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BioShields® *Presents*

AlcoMop™ is a perfumed disinfectant cleaner for ?oor and hard surfaces. Smart action formula with two active ingredients viz. Benzalkonium Chloride, kills the bacteria and other microbes leaving the surface squeaky clean and Ethanol, a good cleanser for hard tiles leaves no residue making the surface look glossy. **AlcoMop™** spreads a distinctive aroma throughout the room adding to its fresh appeal.

Composition: 74 % v/v Ethyl Alcohol IP, 4 % w/v Benzalkonium Chloride IP, Perfume.

Features	Bene?ts
Perfumed disinfectant	Kills bacteria and other microbes, leaving a long lasting freshness.
Benzalkonium chloride + Alcohol	Quickly cleans hard ?oor and surfaces with a lasting shine.
Quick drying formulation	Allows you to mop ?oor and surfaces in short period of time.
Good material compatibly	Allows you to mop almost all kind of ?oor and surfaces.

Directions for Use:
General disinfection of surfaces : Diluted one part of **AlcoMop™** with 40 parts of cleaned water.

Application Areas:
Hospital: Corridor, Waiting room, General ward, Doctors chamber, etc.
Hospitality: Of?ce cabin, Guest room, Theaters/Banquet hall, Corridor, Kitchen platform, Table tops, etc.

Highlights of the coming issue


JOURNAL OF HYGIENE SCIENCES
Committed to the advancement of Clinical & Industrial Disinfection & Microbiology
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Karl Landsteiner.

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Klebsiella oxytoca.

Did You Know
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Best Practices
To prevent SSI (Surgical site infections).

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