EXPLORE

Exploring Science, Developing Technologies

A Quarterly Publication

Vol. 3 Issue 2

YouFirstServices
GROUP OF COMPANIES

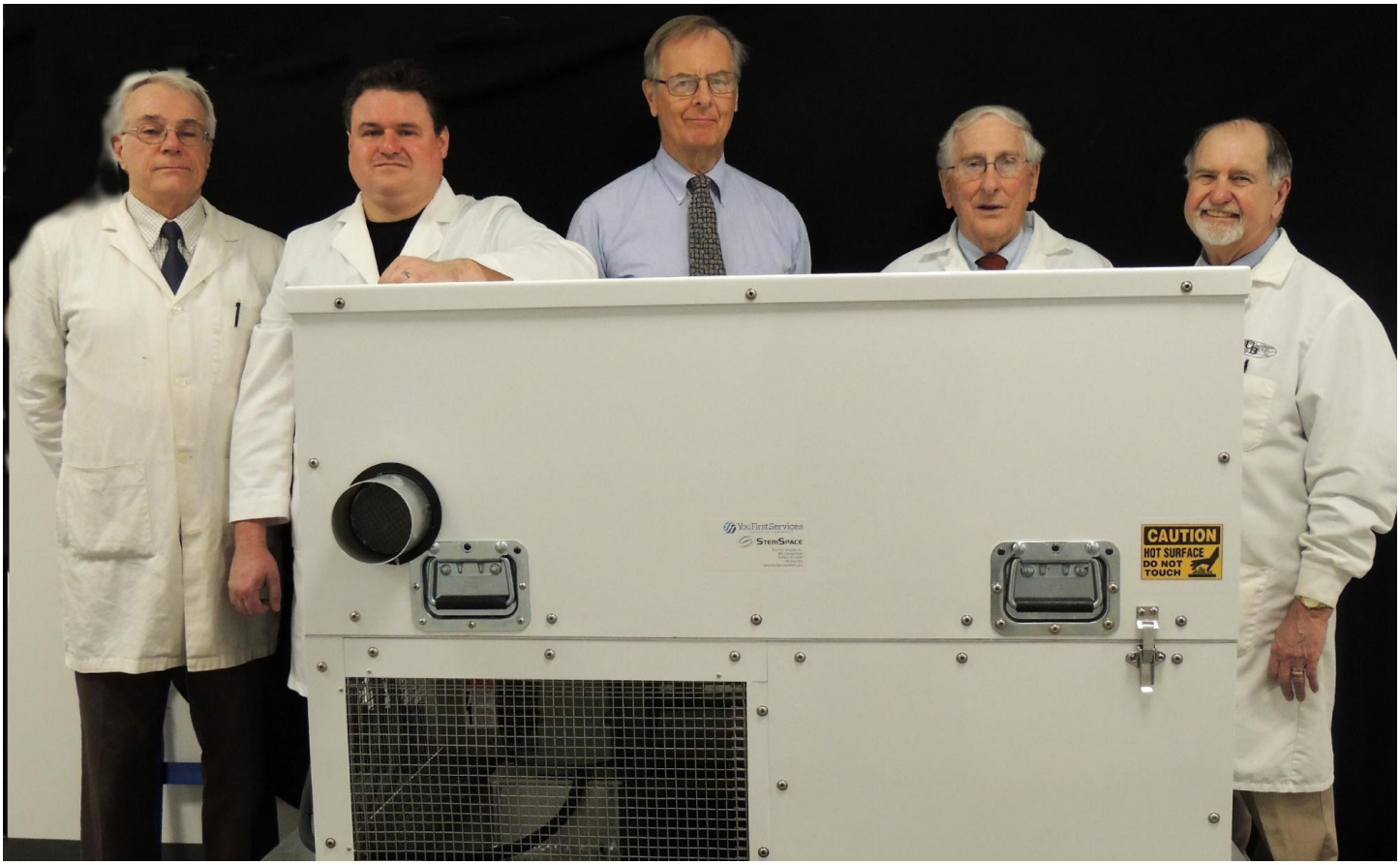
YouFirstServices
GROUP OF COMPANIES

WELCOME!

Published on a quarterly basis, EXPLORE is a newsletter devoted to highlighting recent advancements of the technologies developed at You First Services, Inc. Each of our publications will feature detailed overviews of the the recent work of our company's scientists, engineers, research collaborators, as well as our sales and marketing teams.

You First Services, Inc. aims to provide ground-breaking progress in healthcare through innovative products. Our company aggressively seeks the acquisition of technologies and health-focused applications, nationally and internationally, that will improve the well-being of consumers. We take active risks to bring these innovative solutions to market, while striving to achieve our lofty goal of offering products that can change healthcare throughout the world.

IN THIS ISSUE:



Sterispace™ Undergoing Field Test

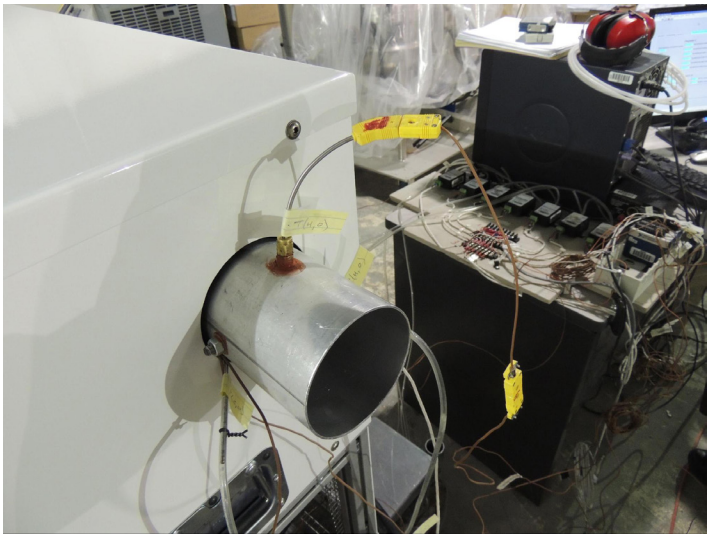
You First Services Inc. is excited to announce the successful in house testing of SteriSpace™ system. The results were outstanding as expected. Presently it is undergoing field tests in Huntsville, Alabama, as per the military specification in order to be augmented to emergency shelters for defense applications in collaboration with emergency shelter suppliers for defense establishments. SteriSpace will replace the filter system which is currently used for the clean air in emergency shelters used in military and disaster hit areas. SteriSpace™ will remove airborne biological contaminants. The SteriSpace™ system has been designed to remove airborne pathogens from a flowing air stream using a patented compressive heating process. The compressive heating of a continuous airflow destroys all biological contaminants including bacterial spores, vegetative bacteria, and viruses in rapid contact within milliseconds. SteriSpace™ is the most effective way to sterilize air and provides next-level air sterilization for a variety of applications.

In a series of U.S. Department of Defense (DOD) funded research and development programs, SteriSpace™ units of various sizes were designed, built and tested. Independent testing has conclusively demonstrated that these devices kill >99.9999% (106 log) of all airborne biological threats. This technology can be used in infection control as well as to minimize exposure to hazardous chemicals in a room or environment.

SteriSpace™ is an innovative air sterilization technology which can be deployed in various healthcare situations, providing clean air in a variety of medical settings such as Negative pressure or

Positive pressure. Negative Pressure can be maintained to prevent contamination of the outside environment by the air from a room where an infected patient is housed. Positive pressure is preferred when a medical procedure like surgery needs to be performed in a closed space where external infectious agents should be prevented from entering.

"SteriSpace™ is the most effective way to sterilize air and provides next-level air sterilization for a variety of applications."



This fully scalable and customizable design can minimize contamination and address the air quality challenges faced by healthcare facilities. An important initial target application for the SteriSpace™ portable or fully integrated unit is in an isolation room or emergency quarantine shelter. Patients with a suspected infection of a highly contagious infectious disease (i.e. MDR-TB, XDR-TB, SARS, Ebola, etc.) can be placed in isolation or quarantine in a room where negative pressure is maintained. The airflow leaving the space would be exhausted through the SteriSpace™ unit, which destroys the bacteria or virus, preventing it from being released into surrounding space or environment. When used in this manner, the SteriSpace™ solution meets the Center for Disease Control Infection Control guidelines.

Sterispace™ Field Test Results

Our SteriSpace™ unit "passed in flying colors" during a recent field test, held in Alabama. The engineering team travelled with the unit to test the site where the unit was fitted with an isolation shelter. Testing was then completed with one of our partners who supplies emergency shelters for defense applications. The 250 CFM unit has undergone testing for temperature and air exchange capabilities, which is ideal for these purposes. The unit can be used as a positive pressure unit or negative pressure unit. The "pre-production" air sterilizer prototype was delivered to our co-collaborator for formal production evaluation prior to implementing the SteriSpace into their existing expeditionary shelter product offering. Overall, the SteriSpace system performed well and our test objectives were satisfied. The system met the collaborators main objectives to provide the required air flow rate and sterilization temperature requirements.

Sterispace™ System Highlights

- The SteriSpace™ system destroys all biological contaminants including bacterial spores, vegetative bacteria, and viruses in rapid contact within milliseconds.
- The SteriSpace™ system has been designed to be fully scalable and customizable to address air quality challenges in healthcare facilities
- In house testing of the system was determined to be successful and the results were found to be outstanding
- In collaboration with an emergency shelter supplier for defense applications, field testing of the SteriSpace™ system was found to be successful and "passed in flying colors"

Field Test Site

PRODUCT UPDATES & CLINICAL STUDIES

GloTran™

To promote sales of the GloTran Plasma Disinfection System, EQM Technologies is entering into new Manufacturer's Representative Agreements with experienced and knowledgeable medical equipment companies specializing in sales and product distribution. Recently, we've signed an official agreement with a manufacturers' representative, who serves hospitals in New England and Upstate New York.

The firm is experienced in medical device disinfectors, sterilizers, and has worked with plasma systems in the past. In October, the team attended an APIC Annual Conference (Association For Professionals in Infection Control & Epidemiology) with our new rep. GloTran was promoted in a big way to nurses, infection control officers, and other health care attendees in this hospital educational session and trade show. The representative is now communicating with potential clients in specialty medical units, and several have been very receptive of the GloTran introduction. Formal product presentations are scheduled for early and mid-December, one of which is at a well-known General Hospital on the East Coast in the New England territory. A GloTran demonstration unit will be offered to this important hospital, in our plight to improve surface disinfection in a Neonatal / Pediatric specialty unit.

Lubricity®

It is very fulfilling to know that Lubricity® dry mouth oral spray is well received by people suffering from dry mouth due to various health conditions. Lubricity® is available for easy purchase in two ounce bottles on our website, on Amazon and in over 1,700 Walgreens stores. Starting November 2018, Lubricity® is also available for purchase on Walmart.com, in addition to increasing availability in continuing care facilities, outpatient clinics, dental offices and independent and outpatient pharmacies across America. Lubricity is available for distribution through McKesson, RDC, Johnson & Lund, international distributors in Canada and now also available through Cardinal Health and many newly signed distributors throughout India.

Advertising for Lubricity® is occurring nationwide, with more emphasis being placed on direct mail marketing, in addition to the ongoing telemarketing and digital marketing campaigns and testing complete of two lots of Lubricity® for sale. Starting this Fall, Lubricity will be available for purchase in a half-ounce bottle as well.

MetaQil®

MetaQil® is now available for easy purchase in two or eight-ounce bottles on our website, on Amazon and in over 1,700 Walgreens stores. Starting November 2018, MetaQil® is also available for purchase on Walmart.com, in addition to increasing availability in independent and outpatient pharmacies across America. MetaQil® is available for distribution through McKesson, and now also through Cardinal Health and many newly signed distributors throughout India. Advertising for MetaQil® is occurring nationwide, with more emphasis being placed on direct mail marketing, in addition to the ongoing telemarketing and digital marketing campaigns.

Clinical Studies

Vaginal Dryness Relief

Vaginal dryness is very common after menopause. It can cause severe irritation and infection. This randomized study soon to be started at the Department of Gynecology at the University at Buffalo and will investigate the tolerability of a novel lubricating solution in patients with symptomatic vaginal dryness and its efficacy in minimizing the symptoms associated with dyspareunia. Please call (716)-323-0725 for more information or enrollment.

Metallic Taste

MetaQil® recently concluded an IRB approved clinical Study at University of Buffalo's Dental School to test the product efficacy in alleviating metallic taste. The study demonstrated that 85% of participants found MetaQil® was effective as a remedy for metallic taste and enthusiastically continued their use of the oral rinse. The complete study report is expected to be available soon.

BIOFILM:

Tenacious and United Microbes!

Author: Dr. Ashu Sharma

Biofilm is a congregation of microbial cells attached on a solid surface encased in a self-produced matrix comprising of proteins, DNA and polysaccharides - knows as the extracellular polymeric substance (EPS). Microbes in a biofilm are endowed with special attributes that increase their fitness and infection capacity. Thus, a same microbe in a biofilm lifestyle differ radically in terms of its biology from its free-living mobile (planktonic) counterpart. Biofilms impact humans in a variety of ways as they can be formed on natural, medical, and industrial surfaces. As a matter of fact, nearly all chronic infections caused by bacteria are biofilm in nature and therefore require special and long-term treatments for eradication. Acute infections, on the other hand, are generally planktonic in nature and must be diagnosed and eradicated rapidly. A best-known example of chronic biofilm infection is the disease known as 'periodontitis' (gum-disease) that inflicts more than 60% of the adult population worldwide. In periodontitis the dental plaque formed on the teeth and around the gums is a form of bacterial biofilm, which if left untreated leads to tooth loss and may affect systemic health. In addition to biofilms formed on human surfaces, formation of bacterial biofilm on medical devices, such as catheters, heart valves and other implants often results in difficult to treat chronic infections. According to one estimate from the Centers for Disease Control and Prevention, approximately 65 percent of all human infectious diseases are biofilm in nature. Moreover, a report from he National Institutes of Health indicate that this may be closer to 80 percent, affecting 17 million Americans with a cost of several billion dollars to the US healthcare system. In addition to human health, biofilms damage civic and industrial infrastructure—such as, water treatment plants, oil and water pipelines and other liquid-immersed structures (biocorrosion and clogging), and shipping vessels, thereby compromising efficiency and increasing running costs and causing harm to the environment.

Biofilm Tenacity.

Biofilm infections are difficult to treat since bacteria living in biofilms are increasingly resistant to antimicrobials and to the host immune defense systems than to their planktonic counterparts. Many known human infectious agents, such as Escherichia coli (pneumonia, urinary tract infections, and diarrhea), Pseudomonas aeruginosa (pneumonia, and risk of infections after surgery), and Staphylococcus aureus (pneumonia, bone and joint infections, skin and wound infections) are able to cause life threatening diseases because of their ability to form biofilms. It has been shown that bacteria in biofilms are more efficient than their planktonic counterparts in pumping out and degrading antimicrobials from their cytoplasm. Moreover, the mechanical integrity of the EPS matrix contributes to difficulties in removing bacteria living protected in biofilms. Also, microbes in biofilms are able to communicate and cooperate with each other more efficiently. The biofilm lifestyle of microbes is akin to community living in which there seems to be a division of labor among bacteria, with biofilm behaving like a multicellular organism.

> "Biofilm infections are difficult to treat since bacteria living in biofilms are increasingly resistant to antimicrobials and to the host immune defense systems..."

Biofilms are not always harmful - they are beneficial too! For example, many useful and friendly bacteria in the human gut that help in the digestion of dietary fibers, production of short chain fatty acids and vitamin B live as biofilms, actinobacteria that grow as biofilms on ants maintain pathogen-free environment and luminous Vibrio bacteria by forming biofilms on the light organs of squids produce light and thus help squids avoid predation.

Biofilm Eradication.

Mechanical breakup of biofilms to smaller pieces can increase accessibility and make bacteria more susceptible to killing by antibiotics and host immune attack (antibodies, phagocytes and immune mediators). Debridement or mechanical scraping of biofilm bacteria is part of standard procedure for treating chronic infections, such as periodontitis and wound infections. For biofilms outside the body—such as on medical devices, other surfaces humans host immune attack (antibodies, phagocytes and immune mediators). Debridement or mechanical scraping of biofilm bacteria is part of standard procedure for treating chronic infections, such as periodontitis and wound infections. For biofilms outside the body—such as on medical devices, other surfaces humans come in contact with, ship hulls or in pipelines for oil or water—mechanical removal with relatively harsh chemicals is possible and is generally a method of choice. However, for treatment of human biofilm infections, gentler and effective methods are needed. To this end, researchers are actively in pursuit of small molecule drugs that can penetrate and target bacterial cells in biofilms and block their unique physiology and chemical communication. Other promising ways that are currently being explored include use of gas plasma, lasers and laser-activated drugs.

- WRITTEN BY:

Dr. Ashu Sharma
Professor, Department of Oral Biology
University at Buffalo School of Dental Medicine

An Overview of Hospital-Acquired Infections: Current Status and Prevention Strategies.

Author: Supriya D. Mahajan, Ph.D.

Hospital-Acquired Infections (HAIs) also known as healthcare-associated infections are acquired during a hospital stay and are typically not present or incubating at the time of admission. The most common HAIs include: Central line-associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), select surgical site infections (SSIs), hospital-onset Clostridioides difficile infections (CDI), and hospital-onset methicillin-resistant Staphylococcus aureus (MRSA) bacteremia (bloodstream infections) (1). Healthcare-associated infections are known to increase the length of stay, health care costs, and mortality. Each year close to 2 million healthcare-associated infections occur in the US resulting in nearly 100,000 deaths and this high morbidity and mortality, costs the healthcare system billions of dollars each year. Center for Disease Control's (CDC's) National Healthcare Safety Network is the most widely used healthcare-associated infection tracking system in the United States and has mandated several guidelines for monitoring infections, performing and monitoring central lines, and isolation of infected patients. More than 23,000 hospitals and other healthcare facilities provide data to NHSN, which in turn is used for national- and state-level analyses, and for targeted prevention initiatives by healthcare facilities, states, regions, quality groups, and national public health agencies. CDC's mission in healthcare safety includes tracking infections, responding to outbreaks, providing infection prevention expertise and guidance, spearheading prevention research, and serving as the nation's gold standard microbiology laboratory for the pathogens most often implicated in HAIs.

The Pathophysiology of HAI

The pathophysiology of HAI Risk factors for hospital-acquired infections include older age, immunosuppression, longer hospital stays, multiple underlying chronic illnesses, frequent encounters with healthcare facilities, recent invasive procedures, mechanical ventilatory support, indwelling devices and stay in a critical care unit with an increased risk of hospital-acquired infections. Transmission of pathogens can occur by direct contact with healthcare workers or contaminated environment. Pathogens tend to colonize in warm and moist areas such as inguinal and perineal area, axilla, and trunk. Some organisms can form tough biofilms around catheters such as Pseudomonas species, Acinetobacter baumannii, and Stenotrophomonas maltophilia. Extraluminal migration of organisms is the major route of infection in central line-associated bloodstream infections. Multidrug-resistant organisms (MDR) are also a significant cause of infections in the hospitals, particularly in the intensive care unit (ICU).

Monitoring HAI

The standardized infection ratio (SIR) is a metric used to track HAIs. It compares the number of observed infections to the number of predicted infections, based on a national baseline. SIR less than 1.0 means fewer HAIs observed during the

reporting period than predicted from baseline data; SIR greater than 1.0 means more HAIs observed than predicted (2). Risk adjustment models for Surgical Site infection (SSI) vary by procedure using different parameters and are typically validated using bootstrap methodology (http://www.jstor.org/stable/10.1086/662016).

2016 National Healthcare-Associated Infections Progress report [3-8]	
Type of HAI	**Acute Care Hospitals**
CLABSI	**11% decrease**
CAUTI	**11% decrease**
Total VAE, including VAC, IVAC, and pVAP (IVAC-plus)	**2% decrease**
C. difficile	**8% decrease**
Surgical Site infection (SSI) (overall for 10 select procedures)	**6% decrease**
SSI for abdominal Hysterectomy	**13 % decrease**
SSI for Colon surgery	**7% decrease**
MRSA Bacteremia	**7% decrease**

Greater awareness and preventative measures, has resulted in reducing the incidence of some types of hospital-acquired infections. Simple preventive measures can reduce hospital-acquired infections, and these include hand hygiene, contact precautions when indicated, antibiotic stewardship to avoid rise of MDR organisms, appropriate antimicrobial prophylaxis particularly for surgeries, patient positioning, subglottic suction to avoid aspiration, strict asepsis when placing a central line, limiting unnecessary use of external devices, removal of catheters as soon as no longer indicated, and decontamination with chlorhexidine bathing for patients in the ICU. Prevention collaborative initiative that consist of multiple hospital teams that implement prevention strategies, share experiences between facilities, measure progress as a group, and provide feedback to clinicians and staff are warranted. CDC has developed the Targeted Assessment for Prevention (TAP) strategy. The TAP strategy targets healthcare facilities and specific units within facilities with a disproportionate burden of HAIs to address infection prevention gaps. The 5-Year National Prevention Target is a 25% reduction in admission and readmission SSI [i.e., national Standardized Infection Ration (SIR) for SSI = 0.75]. Although significant progress has been made in preventing some healthcare-associated infection types, much more needs to be done. A multidisciplinary approach where health care providers can work together to decrease the incidence of these preventable complications is essential to contain Healthcare Associated Infections.

References

1. Weiner LM, Webb AK, Limbago B, Dudeck MA, Patel J, Kallen AJ, Edwards JR, Sievert DM. Antimicrobial-Resistant Pathogens Associated With Healthcare-Associated Infections: Summary of Data Reported to the National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2011-2014. Infect Control Hosp Epidemiol. 2016 Nov;37(11):1288-1301.

2. Centers for Disease Control and Prevention. The NHSN Standardized Infection Ratio (SIR): a guide to the SIR. Available at https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf. Accessed May 8, 2018.

3. Centers for Medicare and Medicaid Services. Hospital Inpatient Quality Reporting Program. Available at https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/hospitalrhqdapu.html. Accessed May 8, 2018.

3. Centers for Medicare and Medicaid Services. Hospital Inpatient Quality Reporting Program. Available at https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/hospitalrhqdapu.html. Accessed May 8, 2018.

4. Centers for Disease Control and Prevention. Acute care hospital surveillance for central line-associated bloodstream infections. / nhsn/acute-care-hospital/clabsi/index.html. Accessed May 8, 2018.

5. Centers for Disease Control and Prevention. Acute care hospital surveillance for catheter-associated urinary tract infections. /nhsn/acute-care-hospital/cauti/index.html. Accessed May 8, 2018.

6. Centers for Disease Control and Prevention. Acute care hospital surveillance for surgical site infections. /nhsn/acute-care-hospital/ssi/index.html. Accessed May 8, 2018.

7. Centers for Disease Control and Prevention. Acute care hospital surveillance for C. difficile, MRSA, and other drug-resistant infections. Available at /nhsn/acute-care-hospital/cdiff-mrsa/index.html. Accessed May 8, 2018.

8. Centers for Disease Control and Prevention. Acute care hospital surveillance for Ventilator-associated Events (VAE). Available at https://www.cdc.gov/nhsn/acute-care-hospital/vae/index.html Accessed May 8, 2018.

- WRITTEN BY

Supriya D. Mahajan, Ph.D.
Associate Professor, Department of Medicine,
Jacobs School of Medicine & Biomedical Sciences
University at Buffalo

Are We Adequately Protected with HEPA Filters?

Author: Bindukumar Nair, Ph.D.

With 99.97% efficiency at collecting particles below 0.2 microns, High Efficiency Particulate Air (HEPA) filters are the primary technology used for many protection applications. HEPA filters are commonly thought to be impenetrable to particulate matter, but in fact they are only 99.97% efficient at collecting the most penetrating particle (~ 0.2 micrometer). While this is a very efficient way of keeping airborne bugs away HEPA filters are vulnerable to various kinds of threats. Viruses are too small to be removed. Despite this fact, HEPA based products were marketed for a long time with the claim to protect from viruses. The US Federal Trade Commission (FTC) has now regulated that HEPA filter based products can no longer make that claim. They mostly shield against bacteria and spores. Most viruses has a submicron size range from ~25 nm – 400 nm [1] capable of causing a variety of diseases. The viral structure contains just a nucleic acid core surrounded by a protein coat; most also contain a lipid membrane, and are termed enveloped. Viruses will not occur as singlets when dispersed in an aerosol, rather they will agglomerate or attach to inert particle that will increase the particle sizes. It is important to note, however, that many of the viruses (e.g., SARS) can be significantly agglomerated and still fall into the post penetrating range. In a study, data gathered from carefully controlled laboratory experiments it was clearly shown that viruses , like inert particles, penetrate through HEPA filters with same efficiency and conclusively prove that they are viable to cause diseases [2]. The minimum infections dose (MID50) for many viruses is very low. While absolute figures are not available, most believe that the MID50 are less than 10 virions [3]. The combination of small size and low infections doses raises concern that HEPA filters may not be adequate to protect individuals from viral infections.

While bacteria are large enough to be trapped, bacteria are understood to release endotoxins into the air stream when dying on the air filter surface. Studies have demonstrated that endotoxins cause inflammatory and atopic responses in non-asthmatic and asthmatic participants.

Mold spores are large enough to be caught in HEPA filters but stay alive on the filter surface. Other particles that accumulate and fill the filter start acting as nutrients and allow mold spores to potentially grow on and through the filter membrane and eventually release new spores into the air. Mold colonization of HEPA and 90–95% filters was observed most often on the load surfaces, were permeated with fungi, Aspergillus flavus, and Cladosporium sp.[4]. Air filters in heating, ventilating, and air conditioning (HVAC) systems, particularly those with chronic or periodic exposure to moisture, may serve as point sources for indoor molds. It is important to say that frequent replacement of filters is critical since pathogens collected on the filter can include live organisms and eventually pathogens are re-released into the air. While HEPA filters remove some particulates from the air, there are many harmful contaminants in the air that aren't particulate

matter. Volatile Organic Compounds (VOCs) are airborne chemicals that mostly derive from off-gassing of building materials or products in our homes as well as cleaning products aside from other sources like beauty products. The most concerning health effect associated with VOCs is that some are well-known carcinogens. HEPA filters are unable to remove VOC's as they simply are far smaller in size than what can be trapped.

[1] C. Hogan Jr, E. Kettleson, M.H. Lee, B. Ramaswami, L. Angenent, P. Biswas, Sampling methodologies and dosage assessment techniques for submicrometre and ultrafine virus aerosol particles, Journal of Applied Microbiology, 99 (2005) 1422-1434.

[2] B.K. Helmbuch, J.K. Hodge, J.D. Wander, Viral penetration of high efficiency particulate air (HEPA) filters, APPLIED RESEARCH ASSOCIATES INC TYNDALL AFB FL, 2007.

[3] J.B. Woods, USAMRIID's Medical Management of Biological Casualties Handbook, United States Army Medical Research Institute of Infectious Diseases., 2005.

[4] D.L. Price, R.B. Simmons, S.A. Crow Jr, D.G. Ahearn, Mold colonization during use of preservative-treated and untreated air filters, including HEPA filters from hospitals and commercial locations over an 8-year period (1996–2003), Journal of Industrial Microbiology and Biotechnology, 32 (2005) 319-32

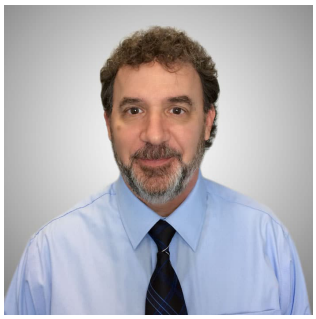
- WRITTEN BY

Bindukumar Nair, Ph.D.
Principal Scientist, You First Services Inc.

WELCOME NEW EMPLOYEES!

Conni Hollis
Accountant

Daniel Bronson
Outside Sales Representative,
Oral Health



Brian Devonshire
Bulk Processor

OUR COLLABORATORS

Ashu Sharma, Ph.D.

Dr. Sharma, a tenured Professor, Department of Oral Biology in University at Buffalo is a research collaborator. His lab studies the pathogenic mechanisms of the red-complex bacteria by utilizing molecular-genetic and biochemical approaches; the bacteria of the red-complex include Porphyromonas gingivalis, Tannerella forsythia (formerly Bacteroides forsythus) and Treponema denticola (a spirochete). Their overall objectives are to gain a better understanding of how these pathogenic bacteria initiate colonization, form biofilms and initiate tissue destructive host immune responses critical for disease progression. The research focuses on identifying virulence factors these bacteria produce and host-cell receptors involved in their recognition.

Gene Morse, PharmD, FCCP, BCPS

Dr. Gene D. Morse, a tenured SUNY Distinguished Professor in the School of Pharmacy and Pharmaceutical Sciences and Associate Director of the Center of Excellence in Bioinformatics and Life Sciences at the University at Buffalo, is an advisory board member. He is Director of the Translational Pharmacology Research Core (TPRC) and Co-Director of the SUNY Global Health Institute. He has been actively involved in drug development research since the introduction of antiretrovirals.

YFS FOUNDATION NEWS

Month	Enrolled Girls	Girls Learning Level					
		Foundation	Class 1	Class 2	Class 3	Class 4	Class 5
June 2018	204	17	159	16	8	4	0
September 2018	204	3	170	11	15	5	0
Change	**0**	**-14**	**+11**	**-5**	**+7**	**+1**	**0**

The new learning centers are located in the rural villages in Uttar Pradesh near Banaras and Alwar in Rajasthan. The details of girls attending the program are given above.