Joint Event on 2nd World Congress on

Infectious Diseases

&

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Pediatric Care & Pediatric Infectious Diseases

August 24-26, 2016 Philadelphia, USA

Keynote Forum

(Day 1)

Glenn S Tillotson, J Infect Dis Ther 2016, 4:4(Suppl)
http://dx.doi.org/10.4172/2332-0877.C1.007

Glenn S Tillotson

Cempra Pharmaceuticals, USA

The burden of antibiotic resistance

Antimicrobial resistance (AMR) is an escalating problem globally. The consequences of resistance may include increased morbidity and mortality. However the economic impact of this problem is poorly understood. In addition to enormous human cost of AMR there have been attempts to estimate the economic costs as well. These would be either direct healthcare costs such as increased length of hospital stays, loss of productivity or secondary social costs such as foregoing medical procedures or refraining from travel because of increased risk. In 2013, the CDC estimated that the direct costs of AMR were US $20 billion with additional productivity losses of US $35 billion. The CDC has also published a list of bacterial species in which antibiotic resistance has reached significant levels. The impact of antibiotic resistance in five species will be discussed namely; *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Staphylococcus aureus* and *Streptococcus pneumoniae*. The global implications of antibiotic resistance will be put into perspective.

Biography

Glenn S Tillotson has over 30 years pharmaceutical experience in pre-clinical and clinical research, commercialization, medical affairs, scientific communications including publication planning strategic drug development, life cycle management and global launch programs. He has been instrumental in the development and launch of ciprofloxacin, moxifloxacin, gemifloxacin, fidaxomicin and several other agents. He is a SVP of Medical Affairs where he is preparing for the launch of solithromycin for community acquired bacterial pneumonia. He has published more than 170 peer-reviewed manuscripts and is on several journal Editorial Advisory Boards including the *Lancet Infectious Disease, eBioMedicine, Expert Reviews in Anti-infective Therapy* and *F1000*.

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Notes:

Rachel Groppo, J Infect Dis Ther 2016, 4:4(Suppl)
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Rachel Groppo
Sanofi Pasteur, USA

Characterization of RSV F prefusion and postfusion specific neutralizing antibody response in animal models

Viral entry of *respiratory syncytial virus* (RSV) is mediated by the fusion glycoprotein protein (F), which exists in two forms; metastable prefusion and stable postfusion. These two forms of F share a common structural region containing several antigenic sites. The prefusion form also contains unique antigenic sites to which potent neutralizing antibodies bind, such as site Ø. Humans repeatedly infected with RSV possess high serum neutralizing antibody titers that are predominantly prefusion specific. To better understand animal models for RSV vaccine evaluation, we assessed whether mice, cotton rats and primates could mount primarily a prefusion specific neutralizing antibody response after infection. To show prefusion specific antibody could be induced in an animal model system, mice were intramuscularly vaccinated with 10 µg recombinant stabilized prefusion or postfusion F protein. Mice immunized with stabilized prefusion protein showed a high neutralizing response with the majority of this activity generated against prefusion specific antigenic sites. Immunization with postfusion F induced a lower neutralizing titer with the majority of neutralizing antibody against antigenic sites common to both prefusion and postfusion F. Mice intranasally immunized twice with RSV mounted a predominant prefusion specific serum neutralizing antibody response. A similar pattern was also seen in cotton rats. Furthermore, African green monkeys intranasally immunized multiple times with RSV showed a robust serum neutralizing response with the majority of this activity specific to prefusion antigenic sites. Thus, animal models of RSV infection mimic the human response in that multiple exposures can induce anF prefusion dominant serum neutralizing response.

Biography

Rachel Groppo has completed her PhD in the laboratory of Dr. Ann Palmenberg at the University of Wisconsin, USA. After completing her Post doctorate at the University of Massachusetts Medical School, she has joined Sanofi Pasteur. Currently she is a Virology Manager at Sanofi Pasteur North American Research.

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Thomas Licker, J Infect Dis Ther 2016, 4:4(Suppl)
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Thomas Licker

Decontamination Professionals International, Infection Control Technologies, USA

Bioremediation: Emergency preparedness and the built environment

Environmental practices in the built environment have evolved rapidly in the past fifteen years. There is an arms race in the fight to maintain the building environment to cross-contamination and infections. Our reaction to solutions to environmental problems in the built environment in a lot of cases has been put on the reactive side do to bottom line costs, yet when an unfavorable event occurs, C level executives and insurance carriers are shocked. This presentation will go over some of the current facility hygiene issues, proper cleaning practices and cross-contamination prevention strategies for future consideration. It looks at a holistic approach to cross-contamination prevention from the residential home to the facility such as healthcare, food and drug manufacturing and transportation environments. A review of new risk reduction technologies that assist environmental professionals in maintaining facilities will be discussed. In addition, we will go over some new certifications and a code of ethics developed by the American Bio-Recovery Association ABRA for contractors, sanitation teams and environmental service providers that will help maintain credibility for those working in the field of biological remediation services. We have learned a lot in the past couple of years regarding bio-remediation practices and emergency preparedness. In many ways we have learned how unprepared we are. The goal of this presentation is to open the eyes of many to the current conditions and the standards we have to develop for the future.

Biography

Thomas Licker has a BS in Environmental Science from Slippery Rock University and has over 20-years experience in handling event driven hazardous materials and biological response actions. He holds an accredited certification as a Council Certified Environmental Infection Control Remediator recognized by the Council for Engineering and Scientific Boards. He is the Director of Infection Control Technologies, a premier bioremediation services company and serves as the Director of Operations for Decontamination Professionals International.

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Stef Stienstra, J Infect Dis Ther 2016, 4:4(Suppl)
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Stef Stienstra
Dutch Armed Forces/Royal Dutch Navy, Netherlands

Drug delivery by tattooing to treat cutaneous leishmaniasis

Background: Leishmaniasis is a vector borne disease that is caused by obligate intra macrophage protozoa of the *Leishmania* species. Leishmaniasis can cause different clinical syndromes including cutaneous leishmaniasis (CL), in which the patient generally presents with one or several ulcers or nodules on the skin, resulting from the infection of phagocytic cells located in the dermis. It often results into severe scar tissue in the skin. Most of the twelve million people infected with *Leishmania* worldwide are CL cases and 1.5 million new cases occur annually.

Objective: WHO has a program to develop new treatments for cutaneous leishmaniasis. This study establishes a proof of concept that a tattoo device can target intra dermal drug delivery against cutaneous leishmaniasis (CL).

Methods: The selected drug is oleylphosphocholine (OlPC) formulated as liposomes, particles known to be prone to macrophage ingestion. First is shown that treatment of cultured *Leishmania* infected macrophages with OlPC liposomes results in a direct dose dependent killing of intracellular parasites. Based on this, *in vivo* efficacy is demonstrated using a 10 day tattooing mediated treatment in mice infected with *L. major* and *L. mexicana*. In both models this regimen results in rapid clinical recovery with complete regression of skin lesions by Day 28. Parasite counts and histopathology examination confirm high treatment efficacy at the parasitic level. Low amount of drug required for tattooing combined with fast clinical recovery may have a positive impact on CL patient management.

Results: This first example of tattoo mediated drug delivery could open to new therapeutic interventions in the treatment of skin diseases. This study demonstrates that the use of a tattoo instrument for drug delivery is possible in the treatment of cutaneous leishmaniasis and that this method can successfully eliminate intracellular parasites at the site of infection. After showing that the selected drug oleylphosphocholine (OlPC) formulated as liposomes could efficiently reach intracellular parasites when in contact with infected macrophages, the activity of the drug was compared *in vivo* in mouse models of Old (*L. major*) and New World (*L. mexicana*) leishmaniasis. Three routes of administrations of the same drug formulation were investigated: systemic (IP) administration, topical administration as a drop and administration via the tattoo instrument. Evaluation parameters included clinical (lesion sizes) and parasitological parameters (burdens) using quantitative and qualitative methods. In all experiments, the tattooing delivery procedure was the most efficacious at both the clinical and parasitological levels.

Limitations: The used tattoo device, used routinely for permanent makeup procedures is not yet optimal for quantitative drug delivery.

Biography

Stef Stienstra is a strategic and creative Consultant in Biomedical Science with a parallel career as a Commander of the reserve of the Royal Dutch Navy. For the Dutch Armed Forces he has responsibility for the counter measures in CBNRe threats and (Medical) consequence management both in a military and a civilian (terrorism) setting. He is a strategic functional specialist for "Health & Environment" of the 1-Civil-Military-Interaction Command (1-CMI) of the Dutch Armed Forces and for 2015 also in the NATO Response Force (NRF), which is in 2015 the responsibility of the 1-German-Netherlands-Corps (1-GNC). In his civil career he works internationally as Consultant or as Scientific Supervisory Board Member for several medical and biotech companies, merely involved in biodefense. He is also a Visiting Professor for Punjab University in Pakistan and Rhein-Waal University in Germany. He has completed his studies in Medicine and in Biochemistry at the University of Groningen in The Netherlands and has extensive practical experience in cell biology, immuno-hematology, biodefense and transfusion medicine.

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(Day 2)

Francis J Castellino, J Infect Dis Ther 2016, 4:4(Suppl)
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Francis J Castellino

University of Notre Dame, USA

Conscription of the host fibrinolytic system as a virulence determinant for *Streptococcus pyogenes*

The virulence determinants of Gram-positive streptococci are more complex than those of Gram-negative strains. For Gram-negative bacteria, lipopolysaccharide (LPS) is a primary virulence factor. In the case of the human pathogen, Gram-positive group A-*streptococcus pyogenes* (GAS) is one virulence factor in the development of a proteolytic surface of GAS cells and this aid in dissemination of the bacteria from epithelial cells of the skin and throat to deep tissues. For skin-tropic strains, this is accomplished by hijacking of the host fibrinolytic system by GAS. For this to occur, there must be GAS surface proteins that bind to the host proenzyme, plasminogen and then the plasminogen must be specifically activated and the proteolytic is under tight and rapid gene regulation since the proteolytic surface is only required at certain stages of the infection. This presentation will discuss these features for a virulent skin-tropic strain of GAS.

Biography

Francis J Castellino is the Kleiderer-Pezold Professor of Biochemistry and Director of the WM Keck Center for Transgene Research at the University of Notre Dame, USA. He has coauthored more that 400 peer reviewed manuscripts.

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Glenn S Tillotson

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Globalization of the unmet need of new antibiotics

Bacterial resistance to antibiotics is an escalating problem. There are significant efforts expanded in the battle to combat this problem. Recent infectious diseases have hit the media especially viral infections such as Ebola, Zika and currently Yellow Fever. The dissemination of these infections is especially worrying but we seem to have played down the bacterial diseases. However, with increasing travel and the growing crisis of refugees it is obvious that the transfer of resistant bacterial infections is highly likely or under-appreciated. Recent examples include azithromycin resistant *Shigella sonnei* infections; NDM-1 *Klebsiella pneumoniae* and other pathogens were from overseas. Additionally resistant infections may transfer within a country where there may be marked susceptibility differences. So what may be the implications of this situation? Companies both small and large are developing antibiotics to combat this issue are faced with multiple regulatory processes. These can be challenging both in terms of completion and in terms of costs. As these issues become more global, there needs to be a mechanism by which a streamlined development process applied so each country or region does not need to repeat or require their own unique evaluations to approve a new antibiotic. The clock is ticking and we are running out of options and as we travel more this can only get worse.

Biography

Glenn S Tillotson has over 30 years pharmaceutical experience in pre-clinical and clinical research, commercialization, medical affairs, scientific communications including publication planning strategic drug development, life cycle management and global launch programs. He has been instrumental in the development and launch of ciprofloxacin, moxifloxacin, gemifloxacin, fidaxomicin and several other agents. He is a SVP of Medical Affairs where he is preparing for the launch of solithromycin for community acquired bacterial pneumonia. He has published more than 170 peer-reviewed manuscripts and is on several journal Editorial Advisory Boards including the *Lancet Infectious Disease, eBioMedicine, Expert Reviews in Anti-infective Therapy* and *F1000.*

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Joanna Zajkowska, J Infect Dis Ther 2016, 4:4(Suppl)
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Joanna Zajkowska
Medical University of Białystok, Poland

TBE: A growing threat in Europe

Tick-borne encephalitis (TBE) is a viral tick-borne infectious disease caused by Flaviviridae that occurs in endemic areas across large regions of Europe and Asia and still is a public health problem in these parts of the world. The total annual number of cases is estimated to be up to 10,000 in Russia and about 3,000 in European countries and constantly increases. TBE may take various courses: Meningitis, meningoencephalitis, meningoencephalomyelitis or eningo-encephalo-radiculitis. Severe courses of TBE infection with higher mortality and long lasting sequelae often affect the patient's quality of life and also influence on society. Other known arthropod-borne Flaviviridae which may affect nervous system are: Yellow fever virus, Dengue virus, *West Nile virus* and Japanese encephalitis virus. In recent decades, many researchers tried to find reasons for increasing number of human TBE cases in endemic regions even if there is a vaccination against TBE on the market. Among potential reasons for the increasing reported incidence of TBE are: Increased mobility of humans increased travelling to endemic areas, climate and socio-economic changes, variations of habitat structure and wildlife community, greater public awareness, better diagnostic methods, vaccination rates and improved reporting. The aim of this lecture is a better understanding of factors influencing on the current epidemiological situation of TBE across Europe and Russia (climatic, environmental and socio-economic changes), characterization of clinical course of the disease and comparison of all these factors in reference to other vector-borne diseases, especially caused by viruses belonging to Flaviviridae.

Biography

Joanna Zajkowska is currently working at Medical University of Białystok, Poland and carries Clinical Research on infectious diseases, especially on tick-borne diseases and nervous system diseases. She is an expert in internal medicine, infectious diseases, public health and epidemiology. She is a Member of ISW-TBE, Wien Austria (International Scientific Working group on Tick-Borne Encephalitis and ESGBOR (ESCMID-European Society of Clinical Microbiology and Infectious Diseases). She has published more than 200 papers in reputed journals and serving as a Reviewer in many journals.

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Stef Stienstra

Dutch Armed Forces/Royal Dutch Navy, Netherlands

Managing biothreat information under the WHO international health regulations of biosecurity

Sharing security threat information is a challenge for governments and their agencies. Especially in biotechnology and microbiology the agencies do not know how to classify or to disclose collected information on potential biothreats. There is vague border between manmade and natural biological threats. An example is the several month delay of the publication of research on the transmissibility of H5N1 avian influenza virus in the leading scientific journal *Science* by researchers of the Erasmus Medical Centre in Rotterdam, The Netherlands. The publication was delayed in 2012 by several months due to the fact that various organizations first wanted to investigate whether the details could be misused by malicious individuals. In the study the researchers show that only a small number of mutations were necessary to change the H5N1 virus so that it can spread through the respiratory system between mammals. This implies that the risk of a H5N1 pandemic cannot be ruled out. On the other hand, this information can be used to develop new therapies and/or vaccines for influenza. It gives also insight into the disease mechanism, which helps in the prevention. The same arguments are valid for therapeutic antibodies, like the antibodies which are developed to treat anthrax. They have an extreme high affinity for the lethal factors of the bacterium and stop the disease but the same antibodies could be misused to select the most pathogenic strains. Microorganisms have from nature itself the capacity to reorganize and change their pathogenicity, which could lead to a pandemic spread of a disease. But if the disease is too infectious and too deadly, like some stains of Ebola Virus, the lethality will be locally limited. But if the incubation time is longer in a certain strain of an Ebola virus, the risks on epidemics and even a pandemic is much higher. The knowledge of these natural mutation mechanisms could be misused to weaponize microorganisms. It enables the engineering of the lethality like it is done with some anthrax strains. Are these laboratory techniques considered as public science or should it be classified? Academics want to publish and to share information for the progress of science and to find useful applications. The Rotterdam scientists were really annoyed when their research was blocked for publication and feared that other groups would be first in publishing a part of their obtained experimental results. Biosafety is already common practice in microbiology but biosecurity is often still questionable. A 'Code of Conduct', like the Dutch Academy of Science has developed, would help; especially for the so called insider risk. Educational programs for the identification and assessment of risks and threats to security have to be developed to give scientists biothreat awareness and for government officials to rationalize the real threat, without damaging the progress of science.

Biography

Stef Stienstra is a strategic and creative Consultant in Biomedical Science with a parallel career as a Commander of the reserve of the Royal Dutch Navy. For the Dutch Armed Forces he has responsibility for the counter measures in CBNRe threats and (Medical) consequence management both in a military and a civilian (terrorism) setting. He is a strategic functional specialist for "Health & Environment" of the 1-Civil-Military-Interaction Command (1-CMI) of the Dutch Armed Forces and for 2015 also in the NATO Response Force (NRF), which is in 2015 the responsibility of the 1-German-Netherlands-Corps (1-GNC). In his civil career he works internationally as Consultant or as Scientific Supervisory Board Member for several medical and biotech companies, merely involved in biodefense. He is also a Visiting Professor for Punjab University in Pakistan and Rhein-Waal University in Germany. He has completed his studies in Medicine and in Biochemistry at the University of Groningen in The Netherlands and has extensive practical experience in cell biology, immuno-hematology, biodefense and transfusion medicine.

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Glenn S Tillotson

Cempra Pharmaceuticals, USA

New macrolides: A much needed evolution

The macrolide class of antibiotics has been in clinical use for over 50 years being the backbone of many empirical therapies in both adults and children. The first of the class was erythromycin which was acid labile and of modest antibacterial activity thus clarithromycin was chemically modified from the parent molecule to yield a more acid stable drug with better activity. Additionally it could be given twice a day. Soon after this improvement azithromycin was developed as a once a day drug with an almost similar bacterial profile. However as these antibiotics was used extensively often as initial therapy in a broad range of respiratory infections across the globe resistance developed by two different mechanisms and thereby reducing activity against *Streptococcus pneumoniae* quite significantly. Indeed in some parts of Asia resistance rates of 80-90% are reported although in the USA it is currently around half of all strains are resistant to the most frequently prescribed oral drug for community acquired pneumonia. In view of this the first ketolide telithromycin was developed to be active against the resistant pneumococcal isolates. It was used very broadly in respiratory tract infections and was soon noticed to cause several severe adverse reactions including liver failure, visual disturbances, neurological events and other significant reactions. In the intervening decade solithromycin, a fourth generation macrolide and the first fluoroketolide has been developed initially for community acquired bacterial pneumonia based on its superior antibacterial activity especially against azithromycin resistant pneumococci based on a unique mode of action. The clinical dossier is with the FDA for review by end of 2016.

Biography

Glenn S Tillotson has over 30 years pharmaceutical experience in pre-clinical and clinical research, commercialization, medical affairs, scientific communications including publication planning strategic drug development, life cycle management and global launch programs. He has been instrumental in the development and launch of ciprofloxacin, moxifloxacin, gemifloxacin, fidaxomicin and several other agents. He is a SVP of Medical Affairs where he is preparing for the launch of solithromycin for community acquired bacterial pneumonia. He has published more than 170 peer-reviewed manuscripts and is on several journal Editorial Advisory Boards including *the Lancet Infectious Disease, eBioMedicine, Expert Reviews in Anti-infective Therapy* and *F1000.*

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Eugenie Bergogne-Berezin

Centre Hospitalo-Universitaire Bichat-Claude Bernard, France

Rationale approach to combat resistance

After 60 years of use of antibiotics, the world experienced antibiotic resistance. Dissemination of genes of resistance in hospitals, in population has imposed to experts to look for measures to combat resistance, major challenges in developed countries. Combat antibiotic resistance includes knowledge of resistance mechanisms, role of genes associated to gene cassettes, multidrug resistance with transmissible plasmids, efflux mode of resistance, role of integrons in acquisition of resistance genes. Among pharmacologic factors, antibiotic distribution in body at site of infection, low serum concentrations (sub-MICs) are factors for emergence of resistance; intracellular concentrations of macrolides, fluoroquinolones are needed to eradicate intracellular *Legionella*, chlamydia. Pharmacokinetic parameters are factors for proper use of antibiotics to combat resistance. Research for new antibiotics is developing in Biotech companies: Rehabilitation of antibiotic classes (glycopeptides, ketolides, oxazolidinones) to overcome resistant Gram positive bacteria; a renovated cyclic peptide colistin (polymyxin) active against "super-bug" *Acinetobacter baumannii*. β-lactamase inhibitors clavulanate, sulbactam, tazobactam did not solve resistance related to β-lactamases C, D, carbapenemases: New β-lactamase inhibitors NXL-104, MK-7655 restore activities to imipenem, 3d generation cephalospsorins. Newer drugs based on integrated new tools, combinatory chemistry, high speed parallel synthesis, genomics and proteomics, able to lead to new bacterial targets: DNA replication, target genes, cellular division, secretion of efflux pumps. Inhibition of virulence of bacterial communication systems, immunomodulatory systems are leading to new molecules: Artilysins as cell wall targets, Torezolid, active on MRSA, Iclaprim (a diaminopyridine-dihydrofolate reductase) inhibits VRSA. The current clinical development estimated in March 2015 the number of new antibiotics to 36 molecules in clinical development in the US.

Biography

Eugenie Bergogne-Berezin is a Professor of Clinical Microbiology at University Diderot, Paris. She has studied MD in Medicine and PhD in Sciences in the early 1970s. She is a Chief of Department of Clinical Microbiology and research group, University Bichat Claude-Bernard and developed research on *Acinetobacter* spp., (nosocomial pathogen, pathogenicity, resistance), pharmacology of antibiotics, tissue distribution (lungs, brain, bronchi), research on intestinal ecology, jejunal flora and bacterial adhesion. She is an Adviser to pharmaceutical companies, expert in pharmacology-toxicology for the Ministry of Health, expert for international journals. She has developed a journal *Antibiotics*, (Elsevier). She has published 6 medical books, many chapters in international infectious diseases books, 200 articles in scientific journals.

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Stef Stienstra

Dutch Armed Forces/Royal Dutch Navy, Netherlands

Investing in public health gives especially in low income countries extremely impressive returns

The implementation of the International Health Regulation (IHR) of WHO in 2005 for worldwide public health systems is already in its second extension phase. At the 2012 deadline only 16% of the countries were fully prepared to detect and respond to pandemics. In 2014 the Ebola Virus Disease outbreak in West Africa was another indicator that WHO's IHR has to be taken seriously. Especially the biosecurity part of IHR is not fully in place yet for most developing countries which make the world vulnerable for bioterrorism. The returns from investing in public healthcare are extremely impressive and are not a high risk venture as with a rapid mortality decline many 'value life years' (VLYs) are gained. For low and middle income countries typically about a quarter of the growths full income resulted from VLYs gained and supports not only the local economy but also the world economy. Therefore several international programs help to prepare low and middle income countries to mitigate outbreaks of infectious diseases. EU CBRN CoE initiatives and the US CBEP, DTRA, CTR, GEIS, DIMO, USAID, PEPFAR and several other programs are involved in establishing public health systems and give local healthcare workers trainings in both disease outbreak mitigation and biosecurity. Zoonotic diseases are the most dangerous for outbreaks as the population does not have natural nor artificial (from vaccination) immune response to new emerging diseases. The recent Ebola Virus Disease outbreak in West Africa was such an example and with proper blood bank facilities in place, the therapy with immunoglobulins obtained from plasma donations survivors was a relatively cheap and effective therapy. International there was some criticism, as for this therapy it is extremely important that the convalescent plasma has to be safe for other blood transmissible diseases but as with other convalescent plasma therapies is feasible, the necessary safety tests can be done also in the laboratories which are installed for the outbreak diagnosis. Convalescent plasma can be obtained from a donor who has survived the disease with a novel hollow fiber blood separation technology of Hemanua and immunoglobulin concentration, which does not need have any sophisticated infrastructure. This patented and recently developed disposable device is developed in cooperation with the Irish Blood Transfusion Service.

Biography

Stef Stienstra is a strategic and creative Consultant in Biomedical Science with a parallel career as a Commander of the reserve of the Royal Dutch Navy. For the Dutch Armed Forces he has responsibility for the counter measures in CBNRe threats and (Medical) consequence management both in a military and a civilian (terrorism) setting. He is a strategic functional specialist for "Health & Environment" of the 1-Civil-Military-Interaction Command (1-CMI) of the Dutch Armed Forces and for 2015 also in the NATO Response Force (NRF), which is in 2015 the responsibility of the 1-German-Netherlands-Corps (1-GNC). In his civil career he works internationally as Consultant or as Scientific Supervisory Board Member for several medical and biotech companies, merely involved in biodefense. He is also a Visiting Professor for Punjab University in Pakistan and Rhein-Waal University in Germany. He has completed his studies in Medicine and in Biochemistry at the University of Groningen in The Netherlands and has extensive practical experience in cell biology, immuno-hematology, biodefense and transfusion medicine.

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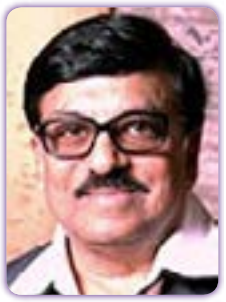

Ashok Kapse
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Emerging and re-emerging infections

We can look forward with confidence to a considerable degree of freedom from infectious diseases at a time not too far in the future. Indeed, it seems reasonable to anticipate that within some measurable time, all the major infections will have disappeared. T. Aidan Cockburn: The Evolution and Eradication of Infectious Diseases; 1963. Five years later the U.S. surgeon general noted that it might be possible with interventions such as antimicrobials and vaccines to "close the book" on infectious diseases and shift public health resources to chronic diseases. How shoddily wrong they were; at about same time there were trickling reports about a crippling wasting disease among Africans which was noticed by missionaries. Soon world realized that these were the earliest cases of a newly emerging infectious disease: HIV/AIDS. The incidence of emerging infectious diseases in humans has increased within the recent past or threatens to increase in the near future. Over 30 new infectious agents have been detected worldwide in the last three decades; 60 percent of these are of zoonotic in origin. A newly emerging disease is a disease that has never been recognized before. HIV/AIDS is an emerging disease, so is severe acute respiratory syndrome (SARS) and a recent H1N1 pandemic. Re-emerging, or resurging diseases are those that have been around for decades or centuries but have come back in a different form or a different location, few of the examples are emergence of microorganisms resistant to antimicrobials to which these were previously sensitive, *P. vivax* acquiring severity, resurgence of diphtheria & Pertussis and recent Ebola outbreak. Microbes could also be the agents of bioterrorism, they are intentionally introduced to harm mankind and thereby they become instruments of deliberately emerging diseases the most recent and important example of which is anthrax. The human species lives in a delicate balance with microbial species; there is an ever-present tension between the two. If we perturb this balance, microbes almost always figure out a way to counterbalance the effect; encroachment of human civilization on the environment and on the microbial species that inhabit our environment invariably triggers emergence or reemergence of infectious diseases. Multiple factors like forest land use for economic development, human demographics & behavior and ever increasing international travel contribute to the emergence and re-emergence of infectious diseases. Two fundamental characteristics of microbe's namely rapid replication and mutation allow them to circumvent our attempts to control them. Their ability to replicate and mutate gives them the advantage of selectively circumventing human interventions, be they antimicrobials, vaccines or public health measures. In this battle with microbes we the humans have two important weapons in our armamentarium: an intellect and a will. We use our intellect and will to implement public health measures, biomedical research and technological advances to contain or at least strike a balance with microbial species that rely on genes, replication and mutation."The future of humanity and microbes likely will unfold as episodes of a suspense thriller that could be titled "Our Wits versus Their Genes"; so rightly said by Dr. Joshua Lederberg.

Biography

Ashok Kapse is a consulting Pediatrician practicing in the city of Surat in the Gujarat state of India, besides owning a private pediatric hospital he is also the Head of the Pediatric Department at a prestigious Mahavir Super Specialty Hospital. After completing graduation (MBBS) he did MD in Pediatrics. Initially he has worked as a Professor of Pediatrics at Medical College Surat, later he opted out for private practice however pursued academic interest. He has developed special interest and skills in infectious diseases. He is a recipient of many oration awards and delivered hundreds of lectures on dengue, malaria, typhoid and antibiotic uses across India. He has decorated many posts in medical fields: President of Surat City Branch of Indian Academy of Pediatrics (IAP), President of Gujarat State Branch of IAP and National President of Infectious Diseases Branch of IAP are few of them. He is an avid Clinical Photographer; his photos figure into various books and atlases including the prestigious atlas of infectious diseases published by American Academy of Pediatrics. He has published umpteen articles in peer reviewed journals.

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Lalit Garg
University of Malta, Malta

Infectious disease progression modeling

Models which can predict disease progression are useful for aiding clinicians in prescribing the correct treatment at the optimal time to produce the best outcome for the patient. Positive correlations between changes in a patient's infection state with respect to other factors of the patient's profile such as age, gender and treatment. We utilize artificial neural networks and phase type survival trees with differing combinations of input covariates to find which ones provide the best predictor of the future state. To demonstrate the model, we used a dataset of 1,838 patients infected with the human immunodeficiency virus (HIV) which were enrolled in the Italian public structures between January 1996 and January 2008. The proposed disease progression models effectively cluster, identify and quantify the effects of these covariates and their interaction in the prediction of HIV disease progression. Our results show that antiretroviral treatment (ART) is the best prognosticator of a patient's future state followed by the CD4+ T-lymphocyte measurement. Other covariates such as gender and age have little impact on the overall accuracy in prediction. Results improved dramatically when predicting if the patients' next state was AIDS (Acquired immunodeficiency syndrome). These results should aid in the management of HIV and its treatment while the methods developed through this research can also be useful for modeling disease progression in patients who have other chronic conditions or diseases such as tuberculosis (TB), the severe acute respiratory syndrome (SARS), cardiovascular disease (CVD), cancer and diabetes.

Biography

Lalit Garg has received his PhD degree from the University of Ulster, UK in 2010. He has received his first degree in Electronics & Communication Engineering from the Barkatullah University, India in 1999 and Postgraduate degree in Information Technology from ABV-IIITM, Gwalior, India in 2001. He is currently a Senior Lecturer in Computer Information Systems at the University of Malta, Malta. He was a Researcher at the Nanyang Technological University, Singapore and at the University of Ulster, UK. His research interests include missing data handling, machine learning, data mining and their applications especially in the healthcare domain. He has published more than 60 technical papers in refereed journals and conferences.

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K C Santosh
University of South Dakota, USA

Automated chest X-ray screening for the evidence of pulmonary abnormalities

The talk is aimed at presenting an automatic chest X-rays screening system to detect pulmonary abnormalities using chest X-rays (CXR) in non-hospital settings. In particular, the primary motivator of the project is the need for screening HIV+ populations in resource-constrained regions for the evidence of Tuberculosis (TB). The system analyzes thoracic edge map, shapes as well as symmetry that exists between the lung sections of the posteroanterior CXRs. In this study, we have used two CXR benchmark collections made available by the U.S. National Library of Medicine and have achieved a maximum abnormality detection accuracy of 88.67% and the corresponding area under the ROC curve of 0.95, which outperforms the reported state-of-the-art.

Biography

K C Santosh worked as a research fellow at the U.S. National Library of Medicine (NLM), National Institutes of Health (NIH). He worked as a postdoctoral research scientist at the LORIA research centre, Universite de Lorraine in direct collaboration with industrial partner ITESOFT, France, for 2 years. He also worked as a research scientist at the INRIA Nancy Grand Est research centre for 3 years, until 2011. K C Santosh has demonstrated expertise in pattern recognition, image processing, computer vision and machine learning with various applications in handwriting recognition, graphics recognition, document information content exploitation, medical image analysis and biometrics. He published more than 60 research articles, including a book section in encyclopedia of electrical and electronics engineering.

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