24 September 2009

This supplement has been prepared to present scientific and technical news items that may be of more interest to technical personnel at RDT&E activities and the labs, or the medics rather than the broader readership of the basic CB Daily. Due to the nature of the material, the articles, if available online, are usually only available through subscription services thus making specific links generally unavailable. Thus, usually only the bibliographic citation is available for use by an activity's technical library.

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Chem-Bio News– S&T Edtion

1. EFFICIENT METHODS FOR LARGE-AREA SURFACE SAMPLING OF SITES CONTAMINATED WITH PATHOGENIC MICROORGANISMS AND OTHER HAZARDOUS AGENTS: CURRENT STATE, NEEDS, AND PERSPECTIVES: *"While significant efforts in devising protocols for large-area surface sampling have been undertaken in the years since the anthrax attacks, there is still a general lack of consensus in optimal sampling materials and the methodology in which they are evaluated."*

2. US PATENT 7518029 - PROCESS FOR DESTRUCTION OF GELLED SULPHUR MUSTARD: *"We claim: 1. A process for the complete destruction of gelled sulphur mustard (SM), comprising the steps of: (a) dissolving gelled sulphur mustard (SM) in organic solvent selected from the group consisting of 2-chloroethanol, methanol, methyl cellosolve, and mixtures and combinations thereof to obtain a clear mixture, (b) transferring and destroying the clear mixture of dissolved gelled SM solution and organic solvent obtained from step (a) using an incinerator; (c) dissolving residual gelled SM obtained from step (b) by adding methyl cellosolve; and (d) chemically converting the dissolved SM obtained from step (c) into non-toxic products by adding powdered sodium hydroxide and then diethylenetriamine."*

3. IOM ISSUES REPORT ON SPECIES-JUMPING DISEASES: *"Significant weaknesses undermine the global community's abilities to prevent, detect early, and respond efficiently to potentially deadly species-crossing microbes, such as the pandemic H1N1 influenza virus sweeping the globe, says a new report from the Institute of Medicine (IOM) and National Research Council."*

4. PULMONARY INFLAMMATION TRIGGERED BY RICIN TOXIN REQUIRES MACROPHAGES AND IL-1 SIGNALING: *"Furthermore, IL1Ra/anakinra cotreatment inhibited ricin-mediated inflammatory responses, including recruitment of neutrophils, expression of proinflammatory genes, and histopathology."*

5. DEVELOPMENT OF MWNT BASED DISPOSABLE BIOSENSOR ON GLASSY CARBON ELECTRODE FOR THE DETECTION OF ORGANOPHOSPHORUS NERVE AGENTS: *"The ability of MWNTs based sensor to reliably measure concentration in the range 7 to 0.5 nM has been demonstrated."*

6. PROTECTION WITH A RECOMBINANT HC OF CLOSTRIDIUM BOTULINUM NEUROTOXIN SEROTYPE A FROM ESCHERICHIA COLI AS AN EFFECTIVE SUBUNIT VACCINE: *"These results clearly suggest that the recombinant AHc highly expressed in Escherichia coli is very efficacious in protecting against challenge with active botulinum neurotoxin serotype A in mouse model and a good subunit candidate vaccine against botulinum neurotoxin serotype A for human use."*

CB Daily Report

Chem-Bio News

EFFICIENT METHODS FOR LARGE-AREA SURFACE SAMPLING OF SITES CONTAMINATED WITH PATHOGENIC MICROORGANISMS AND OTHER HAZARDOUS AGENTS: CURRENT STATE, NEEDS, AND PERSPECTIVES
Biotech Week
September 30, 2009

"The recovery operations following the 2001 attacks with Bacillus anthracis spores were complicated due to the unprecedented need for large-area surface sampling and decontamination protocols. Since this event, multiple reports have been published describing recovery efficiencies of several surface sampling materials."

"These materials include fibrous swabs of various compositions, cloth wipes, vacuum socks, and adhesive tapes. These materials have reported recovery efficiencies ranging from approximately 20% to 90% due to the many variations in their respective studies including sampling material, composition of surface sampled, concentration of contaminant, and even the method of deposition and sample processing. Additionally, the term recovery efficiency is crudely defined and could be better constructed to incorporate variations in contaminated surface composition and end user needs. While significant efforts in devising protocols for large-area surface sampling have been undertaken in the years since the anthrax attacks, there is still a general lack of consensus in optimal sampling materials and the methodology in which they are evaluated."

The full article can be found at: (J.M Edmonds, et. al., "Efficient methods for large-area surface sampling of sites contaminated with pathogenic microorganisms and other hazardous agents: current state, needs, and perspectives". Applied Microbiology and Biotechnology, 2009;84(5):811-6). Link not available.

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US PATENT 7518029 - PROCESS FOR DESTRUCTION OF GELLED SULPHUR MUSTARD
PatentStorm
US Patent Issued: 14 April 2009

"Claims

We claim:

1. A process for the complete destruction of gelled sulphur mustard (SM), comprising the steps of: (a) dissolving gelled sulphur mustard (SM) in organic solvent selected from the group consisting of 2-chloroethanol, methanol, methyl cellosolve, and mixtures and combinations thereof to obtain a clear mixture, (b) transferring and destroying the clear mixture of dissolved gelled SM solution and organic solvent obtained from step (a) using an incinerator; (c) dissolving residual gelled SM obtained from step (b) by adding methyl cellosolve; and (d) chemically converting the dissolved SM obtained from step (c) into non-toxic products by adding powdered sodium hydroxide and then diethylenetriamine.

2. The process of claim 1 wherein the ratio of gelled SM to organic solvent in step (a) is 2:1 to 1:5 w/w.

3. The process of claim 1 wherein the clear mixture of gelled SM and organic solvent produced by step (a) is maintained at a temperature of 20° C. to 50° C. temperature, and for a period of 10 to 90 days.

4. The process of claim 1 wherein in step (a) gelled SM is dissolved in organic solvent in the presence of nitrogen gas bubbled through the mixture for 5 to 30 hours and at a rate of 1 to 10 liter per minute (LPM).

5. The process of claim 1 wherein clear liquid obtained from step (a) is incinerated in step (b) at 800-1500° C. for a period of 1-6 seconds.

6. The process of claim 1 wherein in step (c) the remaining gelled SM is dissolved by adding methyl cellosolve in the ratio of 2:1 to 1:3 w/w.

7. The process of claim 1 wherein in step (c) the gelled SM is dissolved in methyl cellosolve by bubbling nitrogen gas for a period of 1-10 hrs and at a rate of 1 to 10 liter per minute.

8. The process of claim 1 wherein step (d) comprises in-adding powdered sodium hydroxide to methyl cellosolve-gelled SM mixture obtained in step (c) in the ratio of 1:10 to 1:20 w/w.

9. A The process of claim 8 wherein the methyl cellosolve-gelled SM mixture obtained in step (c) is dissolved by bubbling nitrogen for a period of 1-10 hours at a rate of 1 to 10 liter per minute.

10. The process of claim 9 wherein diethylenetriamine is added to methyl cellosolve-gelled SM mixture obtained in step (c), equivalent to 2 to 4 times of methyl cellosolve used.

11. The process of claim 10 wherein the methyl cellosolve-gelled SM mixture is kept for 5-10 days at a temperature of 20° C. to 50° C.”

The full article can be found at: http://www.patentstorm.us/patents/7518029/claims.html

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IOM ISSUES REPORT ON SPECIES-JUMPING DISEASES

Infection Control Today Magazine
September 22, 2009

“Significant weaknesses undermine the global community's abilities to prevent, detect early, and respond efficiently to potentially deadly species-crossing microbes, such as the pandemic H1N1 influenza virus sweeping the globe, says a new report from the Institute of Medicine (IOM) and National Research Council.

The report provides a detailed plan for establishing and funding a comprehensive, globally coordinated system to identify novel zoonotic disease threats as early as possible wherever they arise so appropriate measures can be taken to prevent significant numbers of human illnesses and deaths, and livestock losses.

U.S. federal agencies -- particularly the U.S. Agency for International Development -- should spearhead efforts to develop this system and work with international partners to provide funding and technical assistance to build the expertise, equipment and other components of zoonotic disease surveillance and response capabilities in countries worldwide, said the committee that wrote the report. Species-jumping pathogens have caused more than 65 percent of infectious disease outbreaks in the past six decades, and have racked up more than $200 billion in economic losses worldwide over the past 10 years, the report notes. The U.S. beef industry alone lost $11 billion over three years after the detection of one cow with "mad cow disease" in 2003.”

The full article can be found at: http://www.infectioncontroltoday.com/hotnews/report-on-species-jumping-diseases.html

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PULMONARY INFLAMMATION TRIGGERED BY RICIN TOXIN REQUIRES MACROPHAGES AND IL-1 SIGNALING

Medical Letter on the CDC & FDA
September 20, 2009

“Ricin is a potent ribotoxin considered to be a potentially dangerous bioterrorist agent due to its wide availability and the possibility of aerosol delivery to human populations. Studies in rodents and nonhuman primates have demonstrated that ricin delivered to the pulmonary system leads to acute lung injury and symptoms resembling acute respiratory distress syndrome.”

"Increasing evidence suggests that the inflammatory effects triggered by ricin are responsible for its lethality. We demonstrated previously that ricin administered to the lungs of mice causes death of pulmonary macrophages and the release of proinflammatory cytokines, suggesting macrophages may be a primary target of ricin. Here we examined the requirement for macrophages in the development of ricin-mediated pulmonary inflammation

by employing transgenic (MAFIA) mice that express an inducible gene driven by the c-fms promoter for Fas-mediated apoptosis of macrophages upon injection of a synthetic dimerizer, AP20187. Administration of aerosolized ricin to macrophage-depleted mice led to reduced inflammatory responses, including recruitment of neutrophils, expression of proinflammatory transcripts, and microvascular permeability. When compared with control mice treated with ricin, macrophage-depleted mice treated with ricin displayed a reduction in pulmonary IL-1 beta. Employing mice deficient in IL-1, we found that ricin-induced inflammatory responses were suppressed, including neutrophilia. Neutrophilia could be restored by co-administering ricin and exogenous IL-1 beta to IL-1 alpha/beta(-/-) mice. Furthermore, IL1Ra/anakinra cotreatment inhibited ricin-mediated inflammatory responses, including recruitment of neutrophils, expression of proinflammatory genes, and histopathology. These data suggest a central role for macrophages and IL-1 signaling in the inflammatory process triggered by ricin."

The full article can be found at: (M.L. Lindauer, et. al., "Pulmonary Inflammation Triggered by Ricin Toxin Requires Macrophages and IL-1 Signaling". Journal of Immunology, 2009;183 (2):1419-1426). Link not available.

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DEVELOPMENT OF MWNT BASED DISPOSABLE BIOSENSOR ON GLASSY CARBON ELECTRODE FOR THE DETECTION OF ORGANOPHOSPHORUS NERVE AGENTS
Journal of Technology & Science
October 4, 2009

"The development of a disposable Acetylcholinesterase (AChE) based biosensor is described. Synthesis, purification and further functionalization with oxygen containing hydrophilic functional groups of Carbon nanotubes (CNTs) have been detailed."

"Biosensing activity of functionalized multi walled carbon nanotubes (MWNTs) towards the detection of Organo phosphorus (OP) compound, paraoxon, has been tested using Amperometric method. Functional groups on the surface of MWNTs creates favorable surface for enzyme immobilization and enhances the enzyme electrode interaction by increasing the electron transfer rate due to high electrical conductivity of the MWNTs. Inhibition of AChE by paraoxon is determined by the decrease in catalytic activity of AChE. This results in less production of enzymatic product thiocholine, which leads to reduction in the electroxidation current. The ability of MWNTs based sensor to reliably measure concentration in the range 7 to 0.5 nM has been demonstrated."

The full article can be found at: (N. Jha, et. al., "Development of MWNT Based Disposable Biosensor on Glassy Carbon Electrode for the Detection of Organophosphorus Nerve Agents". Journal of Nanoscience and Nanotechnology, 2009;9(9):5676-5680). Link not available.

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PROTECTION WITH A RECOMBINANT HC OF CLOSTRIDIUM BOTULINUM NEUROTOXIN SEROTYPE A FROM ESCHERICHIA COLI AS AN EFFECTIVE SUBUNIT VACCINE
Drug Week
September 25, 2009

“A recombinant Hc of Clostridium botulinum neurotoxin serotype A (AHc) was successfully expressed in Escherichia coli for use as an antigen, and the purified AHc was used to vaccinate mice and evaluate their survival against challenge with active botulinum neurotoxin serotype A. The mice, given twice or third subcutaneous vaccinations with a dosage of 1 mu g AHc mixed with Freund adjuvant, were completely protected against an intraperitoneal administration of 1,000,000 50% lethal doses (LD50) of neurotoxin serotype A. Following the administration of AHc using alhydrogel adjuvant via the intramuscular route, a strong protective immune response was also elicited in the vaccinated mice."

"A dose-response was observed in protective efficacy with increasing AHc dosage and number of vaccinations.”

Mice that received two injections of >= 0.2 mu g and three injections of >= 0.04 mu g were completely protected when challenged with 100,000 LD50 of neurotoxin serotype A. These results clearly suggest that the recombinant AHc highly expressed in Escherichia coli is very efficacious in protecting against challenge with active botulinum neurotoxin serotype A in mouse model and a good subunit candidate vaccine against botulinum neurotoxin serotype A for human use."

The full article can be found at: (Y.Z. Yu, et. al., “Protection with a recombinant Hc of Clostridium Botulinum neurotoxin serotype A from Escherichia coli as an effective subunit vaccine”. Immunopharmacology and Immunotoxicology, 2009;31(2):261-266). Link not available.

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