

24 June 2010

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 Edition

1. SAFETY OF ADMINISTRATION OF HUMAN BUTYRYLCHOLINESTERASE AND ITS

CONJUGATES WITH SOMAN OR VX IN RATS: *"These results add to the safety assessment of Hu BChE as a bioscavenger countermeasure against nerve agent exposure."*

2. GENE EXPRESSION MEDIATED BY DENDRIMER/DNA COMPLEXES ENCAPSULATED IN BIODEGRADABLE POLYMER MICROSPHERES:

"The ultrasonic dispersion method, which did not involve toxic organic solvents, could keep the bioactivity of DNA and offer good control over the size of microspheres."

3. TARGETED DELIVERY OF ANTIGENS TO THE GUT-ASSOCIATED LYMPHOID TISSUES: 2. EX VIVO EVALUATION OF LECTIN-LABELLED ALBUMIN MICROSPHERES FOR TARGETED DELIVERY OF ANTIGENS TO THE M-CELLS OF THE PEYER'S PATCHES:

"It was concluded from the results of the study that coupling of ligands such as lectin specific to cells of the follicle associated epithelium can increase the targeting of encapsulated candidate antigens for delivery to the Peyer's patches of the intestine for improved oral delivery."

4. IMPROVEMENT OF THE THERMAL BEHAVIOUR OF GYPSUM BLOCKS BY THE INCORPORATION OF MICROCAPSULES CONTAINING PCMS OBTAINED BY SUSPENSION POLYMERIZATION WITH AN OPTIMAL CORE/COATING MASS RATIO:

"The feasibility of incorporating microcapsules containing Phase Change Materials (PCMs), previously obtained by a suspension polymerization process, in gypsum wallboards to increase the wall energy storage capacity was studied." [See ANALYST NOTE.]

5. INHIBITION OF RETROGRADE TRANSPORT PROTECTS MICE FROM LETHAL RICIN

CHALLENGE: *"Our work discovers the first small molecule that shows efficacy against ricin in animal experiments and identifies the retrograde route as a potential therapeutic target."*

6. CRYSTALLIZATION AND PRELIMINARY X-RAY ANALYSIS OF EBOLA VP35 INTERFERON INHIBITORY DOMAIN MUTANT PROTEINS:

"The wild-type VP35 IID structure revealed several conserved residues that are important for dsRNA binding and interferon antagonism."

7. 2010 CB DEFENSE S&T CONFERENCE CALL FOR PAPERS - ABSTRACT SUBMISSION DEADLINE IS NOON ON 2 JULY 2010:

"The 2010 Chemical and Biological Defense Science and Technology (CBD S&T) Conference, to be held in Orlando, FL on 15-19 November 2010, will focus on platform and poster presentations of basic and applied research in specific areas of chemical and biological defense. The opportunity to give presentations will be awarded based on the quality and content of the abstracts received. The Conference is particularly interested in relevant innovations or developments that have not yet been introduced to the CB Defense community."

8. AMA WEIGHS INFECTION HAZARD POSED BY MEDICAL ATTIRE: *"One culprit in the accidental spread of disease is the common lab coat and scrubs worn by medical personnel. According to recent studies conducted by the University of Maryland and Virginia Commonwealth University, lab coat sleeves can be an unwitting carrier of infection, opening the door to accidental exposure for patients to methicillin-resistant Staphylococcus aureus (MRSA) when in contact with hospital staff and doctors."*

CB Daily Report

SAFETY OF ADMINISTRATION OF HUMAN BUTYRYLCHOLINESTERASE AND ITS CONJUGATES WITH SOMAN OR VX IN RATS

Energy & Ecology
June 18, 2010

"We evaluated the effects of conjugated enzyme-nerve agent product resulting from the inhibition of bioscavenger human serum butyrylcholinesterase (Hu BChE) by nerve agents soman or VX. Rats were trained on a multiple Fixed-Ratio 32, Extinction 30 sec. (FR32, Ext30) schedule of food reinforcement and then injected (i.m.) with Hu BChE (30 mg/kg), equivalent amounts of Hu BChE-soman conjugate (GDC), Hu BChE-VX conjugate, oxotremorine (OXO) (0.316 mg/kg) or vehicle (n = 8, each group)."

"On the day of injection and on 10 subsequent daily sessions, performance was evaluated on the FR32, Ext30 schedule. Neither conjugates nor Hu BChE produced a performance deficit under the schedule. OXO produced a substantial decrease in responding on the day of administration, with complete recovery observed on subsequent sessions. None of the treatments affected circulating acetylcholinesterase (AChE) activity when evaluated 24-72 hr after injection. The dose of Hu BChE produced a 20,000-fold increase above baseline in circulating BChE activity. Pathological evaluation of organ systems approximately 2 weeks following administration of conjugates or Hu BChE alone did not show toxicity. Taken together, these results suggest that Hu BChE - nerve agent conjugates produced following bioscavenger protection against nerve agents soman and VX do not appear to be particularly toxic."

"These results add to the safety assessment of Hu BChE as a bioscavenger countermeasure against nerve agent exposure."

The full article can be found at: (R.F. Genovese, et. al., "Safety of Administration of Human Butyrylcholinesterase and its Conjugates with Soman or VX in Rats". Basic & Clinical Pharmacology & Toxicology, 2010;106(5):428-434). Link not available.

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GENE EXPRESSION MEDIATED BY DENDRIMER/DNA COMPLEXES ENCAPSULATED IN BIODEGRADABLE POLYMER MICROSPHERES

Life Science Weekly
June 22, 2010

"A convenient and effective 'ultrasonic dispersion method' was used to fabricate vector/DNA complexes encapsulated microspheres. Polyamidoamine (PAMAM) dendrimer/DNA complexes protected by a water-soluble polymer, poly-alpha,beta-[N-(2-hydroxyethyl)-L-aspartamide] (PHEA), were encapsulated in a polymer film mainly composed of cholic acid functionalized star poly(DL-lactide), which degraded through surface erosion mechanism with a fast degradation rate."

"The PAMAM/DNA complexes encapsulated polymer film was then immersed in ethanol and ultrasonicated to afford the microspheres. The in vitro gene transfections showed PAMAM/DNA complexes protected by PHEA exhibited a much higher transfection activity compared with PAMAM/DNA complexes without the protection by PHEA. The expressions of pGL3-Luc in HEK293 cells could be effectively mediated by the polymer film and microspheres with the presence of PHEA."

"The ultrasonic dispersion method, which did not involve toxic organic solvents, could keep the bioactivity of DNA and offer good control over the size of microspheres."

The full article can be found at: (H.L. Fu, et. al., "Gene expression mediated by dendrimer/DNA

complexes encapsulated in biodegradable polymer microspheres". Journal of Microencapsulation, 2010;27(4):345-54). Link not available.

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TARGETED DELIVERY OF ANTIGENS TO THE GUT-ASSOCIATED LYMPHOID TISSUES: 2. EX VIVO EVALUATION OF LECTIN-LABELLED ALBUMIN MICROSPHERES FOR TARGETED DELIVERY OF ANTIGENS TO THE M-CELLS OF THE PEYER'S PATCHES

Health & Medicine Week

June 21, 2010

"The purpose of this study was to evaluate the possibility of lectin-coupled microspheres to improve the targeted delivery of protein antigens to the lymphoid tissues of mucosal surfaces. Bovine serum albumin containing acid phosphatase model protein and polystyrene microspheres were coupled with mouse M-cell-specific Ulex europaeus lectin."

"The coupling efficiency, physical characteristics and the binding capabilities of the microspheres to the follicle associated epithelium of the Peyer's patches were evaluated in vitro and ex vivo in mice intestine. The results showed that coupling of lectin to albumin microspheres did not significantly affect the bioactivity of the encapsulated acid phosphatase model protein. It was also shown that there was preferential binding of the lectin-coupled microspheres to the follicle-associated epithelium."

"It was concluded from the results of the study that coupling of ligands such as lectin specific to cells of the follicle associated epithelium can increase the targeting of encapsulated candidate antigens for delivery to the Peyer's patches of the intestine for improved oral delivery."

The full article can be found at: (J. Akande, et. al., "Targeted delivery of antigens to the gut-associated lymphoid tissues: 2. Ex vivo evaluation of lectin-labelled albumin microspheres for targeted delivery of antigens to the M-cells of the Peyer's patches". Journal of Microencapsulation, 2010;27(4):325-36). Link not available.

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IMPROVEMENT OF THE THERMAL BEHAVIOUR OF GYPSUM BLOCKS BY THE INCORPORATION OF MICROCAPSULES CONTAINING PCMS OBTAINED BY SUSPENSION POLYMERIZATION WITH AN OPTIMAL CORE/COATING MASS RATIO

Health & Medicine Week

June 21, 2010

"The feasibility of incorporating microcapsules containing Phase Change Materials (PCMs), previously obtained by a suspension polymerization process, in gypsum wallboards to increase the wall energy storage capacity was studied. Firstly, the energy storage capacity of the resulting microcapsules and the microencapsulation efficiency was maximized by studying the influence of the synthesis variable core/coating mass ratio on the suspension polymerization process."

"the higher paraffin wax to styrene monomer mass ratio, the lower microencapsulation efficiency. A mass ratio of Rubitherm ® RT27 to styrene monomer equal 1.5 allowed to obtain microcapsules with the highest energy storage capacity and a good microencapsulation efficiency. It was also observed that the energy storage capacity is dependent on the particle size; the maximum capacity was obtained for a particle size of 500 µm. Finally, the thermal behaviour of three gypsum wallboards one without PCMs and the others doped with 4.7% and 7.5% by weight of microcapsules containing Rubitherm ® RT27 at the optimal core/coating mass ratio was studied. the higher the amount of microcapsules containing PCMs incorporated to the gypsum wallboard, the lower or higher the external wall temperature for heating or cooling process, respectively."

"Besides, the incorporation of the microcapsules to the wall increased the time required to achieve the final steady state, verifying that the material insulation capacity was enhanced by increasing PCMs

content in the wall."

The full article can be found at: (A.M. Borreguero, et. al., "Improvement of the thermal behaviour of gypsum blocks by the incorporation of microcapsules containing PCMS obtained by suspension polymerization with an optimal core/coating mass ratio". Applied Thermal Engineering, 2010;30(10):1164-1169). Link not available.

ANALYST NOTE: This article was included to highlight the changes that have, and are occurring, in such mundane items as sheet rock and to note their possible influence on past, even old work, regarding such concepts as the "wall effect" and the off-gassing of agents and decontaminants in an enclosed environment.

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INHIBITION OF RETROGRADE TRANSPORT PROTECTS MICE FROM LETHAL RICIN CHALLENGE

Life Science Weekly

June 15, 2010

"To gain access to their cytosolic target, ribosomal RNA, these toxins follow the retrograde transport route from the plasma membrane to the endoplasmic reticulum, via endosomes and the Golgi apparatus."

"Here, we used high-throughput screening to identify small molecule inhibitors that protect cells from ricin and Shiga-like toxins. We identified two compounds that selectively block retrograde toxin trafficking at the early endosome-TGN interface, without affecting compartment morphology, endogenous retrograde cargos, or other trafficking steps, demonstrating an unexpected degree of selectivity and lack of toxicity. In mice, one compound clearly protects from lethal nasal exposure to ricin."

"Our work discovers the first small molecule that shows efficacy against ricin in animal experiments and identifies the retrograde route as a potential therapeutic target."

The full article can be found at: (B. Stechmann, et. al., "Inhibition of Retrograde Transport Protects Mice from Lethal Ricin Challenge". Cell, 2010;141(2):231-242). Link not available.

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CRYSTALLIZATION AND PRELIMINARY X-RAY ANALYSIS OF EBOLA VP35 INTERFERON INHIBITORY DOMAIN MUTANT PROTEINS

Life Science Weekly

June 22, 2010

"VP35 is one of seven structural proteins encoded by the Ebola viral genome and mediates viral replication, nucleocapsid formation and host immune suppression. The C-terminal interferon inhibitory domain (IID) of VP35 is critical for dsRNA binding and interferon inhibition."

"The wild-type VP35 IID structure revealed several conserved residues that are important for dsRNA binding and interferon antagonism. Here, the expression, purification and crystallization of recombinant Zaire Ebola VP35 IID mutants R312A, K319A/R322A and K339A in space groups P6(1)22, P2(1)2(1)2(1) and P2(1), respectively, are described."

The full article can be found at: (D.W. Leung, et. al., "Crystallization and preliminary X-ray analysis of Ebola VP35 interferon inhibitory domain mutant proteins". Acta Crystallographica Section F, Structural Biology and Crystallization Communications, 2010;66(Pt 6):689-92). Link not available.

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2010 CB DEFENSE S&T CONFERENCE CALL FOR PAPERS - ABSTRACT SUBMISSION DEADLINE IS NOON ON 2 JULY 2010

CBRNIAC email

June 18, 2010

“Abstract Submission Deadline is Noon on 2 July 2010

The 2010 Chemical and Biological Defense Science and Technology (CBD S&T) Conference, to be held in Orlando, FL on 15-19 November 2010, will focus on platform and poster presentations of basic and applied research in specific areas of chemical and biological defense. The opportunity to give presentations will be awarded based on the quality and content of the abstracts received. The Conference is particularly interested in relevant innovations or developments that have not yet been introduced to the CB Defense community.

Topic descriptions can be found online under the Call for Papers page. Abstracts should be submitted through the conference website (<http://cbdstconf2010.sainc.com/>) by noon on 2 July 2010. Abstracts should be 250-500 words long and include the following technical information:

- Background (purpose/objective/rationale of the research, relationship to other areas if any)
- Methods
- Preliminary results
- Preliminary conclusion
- Potential impact to mission/warfighter (if known)

A panel will review each submission; notifications will be sent by 19 August 2010.

Please visit the conference website for complete information: <http://cbdstconf2010.sainc.com/>

Link not available.

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AMA WEIGHS INFECTION HAZARD POSED BY MEDICAL ATTIRE

Infection Control Today Magazine

June 21m 2010

“One culprit in the accidental spread of disease is the common lab coat and scrubs worn by medical personnel. According to recent studies conducted by the University of Maryland and Virginia Commonwealth University, lab coat sleeves can be an unwitting carrier of infection, opening the door to accidental exposure for patients to methicillin-resistant *Staphylococcus aureus* (MRSA) when in contact with hospital staff and doctors.

For this reason, the American Medical Association (AMA) recently announced plans to begin formal research on "textile transmission of infections" at their annual conference of medical professionals and physicians in Chicago. A Reference Committee proposal took special note to single out the "physician's white lab coat as a primary concern associated with textile transmission of infections."

"Lab coats or scrubs can be the source of some serious bacterial hazards like MRSA," says Charles P. Gerba, PhD, a professor of environmental microbiology in the Department of Microbiology and Immunology at the University of Arizona. "When doctors or nurses lean over the beds of patients who are carrying organisms, their clothing can become contaminated. Hours later that bacteria can still be alive and passed on through incidental contact with other patients."

The full article can be found at: <http://www.infectioncontroltoday.com/hotnews/hazard-posed-by-medical-attire.html>

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Steve Tesko: Steve.Tesko@anser.org

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