

7 January 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.

Should you wish to be removed from this S&T Supplement address group, just send an email to one of the people listed at the bottom of this message. This will not affect your continued receipt of the CB Daily.

Chem-Bio News – S&T Edition

1. ADSORPTION OF DIAZINON AND FENITOTHION ON MCM-41 AND MCM-48 MESOPOROUS SILICAS FROM NON-POLAR SOLVENT: *"Nitrogen adsorption measurements showed that the specific surface area of both silicas decreases after the adsorption of pesticides, and the larger effect is observed for diazinon."*

2. DISINFECTANTS 'TRAIN' SUPERBUGS TO RESIST ANTIBIOTICS: *"Scientists know bacteria can become inured to disinfectant, but research increasingly shows the same process may make them resistant to certain drugs."*

3. LEVELS OF THE SECRETED VIBRIO CHOLERAE ATTACHMENT FACTOR GBPA ARE MODULATED BY QUORUM-SENSING-INDUCED PROTEOLYSIS: *"This could provide a mechanism for GbpA-mediated attachment to, and detachment from, surfaces in response to environmental cues."*

4. A NOVEL REGULATORY PROTEIN INVOLVED IN MOTILITY OF VIBRIO CHOLERA: *"We hypothesize that the inner membrane protein FlrD interacts with the cytoplasmic FlrBC complex to activate class III and IV gene transcription."*

5. A NOVEL GABAERGIC AFFERENT INPUT TO THE PONTINE RETICULAR FORMATION: THE MESOPONTINE GABAERGIC COLUMN: *"The contiguous, columnar, anatomical distribution suggests operation as a functional neural system, which may influence expression of REM sleep, wake and other behaviors subserved by the PnO. ."*

6. SHARING A HOSPITAL ROOM INCREASES RISK OF SUPERBUGS: *"Staying in a multi-bed hospital room dramatically increases the risk of acquiring a serious infectious disease, Queen's University researchers have discovered."*

CB Daily Report

Chem-Bio News

ADSORPTION OF DIAZINON AND FENITOTHION ON MCM-41 AND MCM-48 MESOPOROUS SILICAS FROM NON-POLAR SOLVENT

Journal of Technology & Science
December 20, 2009

"The adsorption of two common organophosphorus pesticides, diethoxy-[(2-isopropyl-6-methyl-4-pyrimidinyl)oxy]-thioxophosphorane (diazinon) and dimethoxy-(3-methyl-4-nitrophenoxy)-thioxophosphorane (fenitrothion), by MCM-41 and MCM-48 mesoporous silicas at room temperature was investigated. UVvis and IR spectroscopy, small-angle X-ray diffraction, and the specific surface area analysis (S (BET)) were used to study the adsorption behavior of diazinon and fenitrothion," researchers in Iran report.

"The results show that the MCM-41 and MCM-48 mesoporous silicas adsorb diazinon more efficiently

than fenitrothion. The extraction of adsorbed materials from the adsorbents with polar solvents and subsequent analysis by P-31 NMR showed that the adsorption of diazinon and fenitrothion on mesoporous silicas is destructive and non-destructive, respectively. Nitrogen adsorption measurements showed that the specific surface area of both silicas decreases after the adsorption of pesticides, and the larger effect is observed for diazinon."

The full article can be found at: (M. Armaghan, et. al., "Adsorption of diazinon and fenitrothion on MCM-41 and MCM-48 mesoporous silicas from non-polar solvent". Colloid Journal, 2009;71(5):583-588). Link not available.

[Return to Top](#)

DISINFECTANTS 'TRAIN' SUPERBUGS TO RESIST ANTIBIOTICS

BBC

December 28, 2009

"Scientists know bacteria can become inured to disinfectant, but research increasingly shows the same process may make them resistant to certain drugs.

This can occur even with an antibiotic the bacteria have not been exposed to.

Writing in Microbiology, the National University of Ireland team, who focused on a common hospital bacterium, urges a rethink of how infections are managed.

Scientists in Galway found that by adding increasing amounts of disinfectant to cultures of pseudomonas aeruginosa in the lab, the bacteria learnt to resist not only the disinfectant but also ciprofloxacin - a commonly-prescribed antibiotic - even without being exposed to it.

The researchers report the bacteria had adapted to pump out anti-microbial agents - be they a disinfectant or an antibiotic - from their cells.

The adapted bacteria also had a mutation in their DNA that allowed them to resist ciprofloxacin-type antibiotics specifically.

Pseudomonas aeruginosa is a bacterium most likely to infect those who are already seriously ill."

The full article can be found at: <http://news.bbc.co.uk/2/hi/health/8427399.stm>

[Return to Top](#)

LEVELS OF THE SECRETED VIBRIO CHOLERAE ATTACHMENT FACTOR GBPA ARE MODULATED BY QUORUM-SENSING-INDUCED PROTEOLYSIS

Gastroenterology Week

December 21, 2009

"This attachment is followed by expression of the toxin-coregulated pilus, microcolony formation, and cholera toxin (CT) production. We have recently characterized a secreted attachment factor, GlcNAc binding protein A (GbpA), which functions in attachment to environmental chitin sources as well as to intestinal substrates. Studies have been initiated to define the regulatory network involved in GbpA induction. At low cell density, GbpA was detected in the culture supernatant of all wild-type (WT) strains examined. In contrast, at high cell density, GbpA was undetectable in strains that produce HapR, the central regulator of the cell density-dependent quorum-sensing system of V. cholerae. HapR represses the expression of genes encoding regulators involved in V. cholerae virulence and activates the expression of genes encoding the secreted proteases HapA and PrtV. We show here that GbpA is degraded by HapA and PrtV in a time-dependent fashion. Consistent with this, Delta hapA Delta prtV strains attach to chitin beads more efficiently than either the WT or a Delta hapA Delta prtV Delta gbpA

strain. These results suggest a model in which GbpA levels fluctuate in concert with the bacterial production of proteases in response to quorum-sensing signals."

"This could provide a mechanism for GbpA-mediated attachment to, and detachment from, surfaces in response to environmental cues."

The full article can be found at: (B.A. Jude, et. al., "Levels of the Secreted *Vibrio cholerae* Attachment Factor GbpA Are Modulated by Quorum-Sensing-Induced Proteolysis". *Journal of Bacteriology*, 2009;191(22):6911-6917). Link not available.

[Return to Top](#)

A NOVEL REGULATORY PROTEIN INVOLVED IN MOTILITY OF VIBRIO CHOLERA

Genomics & Genetics Weekly

December 25, 2009

"The flagellar gene operons are organized into a hierarchy composed of four classes (I to IV) based on their temporal expression patterns. Some regulatory elements involved in flagellar gene expression have been elucidated, but regulation is complex and flagellar biogenesis in *V. cholerae* is not completely understood. In this study, we determined that the virulence defect of a *V. cholerae* cheW1 deletion mutant was due to polar effects on the downstream open reading frame VC2058 (*flrD*). Expression of *flrD* in trans restored the virulence defect of the cheW1 deletion mutant, and deletion of *flrD* resulted in a *V. cholerae* strain attenuated for virulence, as determined by using the infant mouse intestinal colonization model. The *flrD* mutant strain exhibited decreased transcription of class III and IV flagellar genes and reduced motility. Transcription of the *flrD* promoter, which lies within the coding sequence of cheW1, is independent of the flagellar transcriptional activators FlrA and RpoN, which activate class II genes, indicating that *flrD* does not fit into any of the four flagellar gene classes. Genetic epistasis studies revealed that the two-component system FlrBC, which is required for class III and IV flagellar gene transcription, acts downstream of *flrD*."

"We hypothesize that the inner membrane protein FlrD interacts with the cytoplasmic FlrBC complex to activate class III and IV gene transcription."

The full article can be found at: (M. Moisi, et. al., "A Novel Regulatory Protein Involved in Motility of *Vibrio cholera*". *Journal of Bacteriology*, 2009;191(22):7027-7038). Link not available.

[Return to Top](#)

A NOVEL GABAERGIC AFFERENT INPUT TO THE PONTINE RETICULAR FORMATION: THE MESOPONTINE GABAERGIC COLUMN

Biotech Week

December 23, 2009

"Pharmacological manipulations of gamma-aminobutyric acid (GABA) neurotransmission in the nucleus pontis oralis (PnO) of the rat brainstem produce alterations in sleep/wake behavior. Local applications of GABA(A) receptor antagonists and agonists increase REM sleep and wake, respectively."

"These findings support a role for GABAergic mechanisms of the PnO in the control of arousal state. We have been investigating sources of GABA innervation of the PnO that may interact with local GABA(A) receptors in the control of state. Utilizing a retrograde tracer, cholera toxin-B subunit (CTb), injected into the PnO and dual-label immunohistochemistry with an antibody against glutamic acid decarboxylase-67 (GAD67), we report on a previously unidentified GABAergic neuronal population projecting to the contralateral PnO appearing as a column of cells, with long-axis in the sagittal plane, extending through the midbrain and pons. We refer to these neurons as the mesopontine GABAergic column (MPGC)."

"The contiguous, columnar, anatomical distribution suggests operation as a functional neural system,

which may influence expression of REM sleep, wake and other behaviors subserved by the PnO. ."

The full article can be found at: (C.L. Liang, et. al., "A novel GABAergic afferent input to the pontine reticular formation: The mesopontine GABAergic column". Brain Research, 2009;1297():32-40). Link not available.

[Return to Top](#)

SHARING A HOSPITAL ROOM INCREASES RISK OF SUPERBUGS

Infection Control Today Magazine

January 05, 2010

"Staying in a multi-bed hospital room dramatically increases the risk of acquiring a serious infectious disease, Queen's University researchers have discovered. A new study led by infectious diseases expert Dr. Dick Zoutman says the chance of acquiring serious infections such as Clostridium difficile rises with the addition of every hospital roommate.

"If you're in a two-, three- or four-bedded room, each time you get a new roommate your risk of acquiring these serious infections increases by 10 percent," says Zoutman, professor of community health and epidemiology at Queen's. "That's a substantial risk, particularly for longer hospital stays when you can expect to have many different roommates."

Zoutman suggests hospitals need to consider more private rooms in their planning. "Despite other advances, multi-bedded rooms are still part of hospital design in the 21st century. Building hospitals with all private rooms is not yet the standard in Ontario or Canada – but it should be."

The full article can be found at: <http://www.infectioncontroltoday.com/hotnews/sharing-hospital-room-and-superbugs.html>

[Return to Top](#)

END of CB Daily Report.

Send subscription requests, unsubscribing requests, questions and comments to:

Steve Tesko: Steve.Tesko@anser.org

Copyright 2008. *Analytic Services Inc.*

[Analytic Services Inc. DMCA Copyright Notice: http://www.homelandsecurity.org/bulletin/Draft_ANSER_DCMA_Copyright_Notice.htm](http://www.homelandsecurity.org/bulletin/Draft_ANSER_DCMA_Copyright_Notice.htm)

Use of these news articles does not reflect official endorsement.
In accordance with Title 17 (USC), Section 107, this material is distributed without profit or payment and is intended for nonprofit research and educational purposes only.
Reproduction for private use or gain is subject to original copyright restrictions.

PRIVACY POLICY

Content provided in the *CB Daily Report* does not reflect the viewpoint(s) of Analytic Services Inc. Analytic Services Inc. does not share, publish, or in any way redistribute subscriber email addresses or any other personal information.