

21 August 2008

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## **Chem-Bio News – S&T Supplement**

**1. GEL RELEASES DRUGS ON CUE:** *"Many protein drugs, such as insulin and erythropoietin, are inactivated by the digestive enzymes in the gut, and so have to be regularly injected into the blood."*

**2. STANFORD DEVELOP METHOD TO OVERCOME MULTIPLE DRUG RESISTANT DISEASES:** *"Nature has developed all of this firepower for getting things into cells, and one of the ways is to create entities that are arginine-rich," said Paul Wender, the Bergstrom Professor of Chemistry at Stanford University."*

**3. A STUDY OF THE ENTEROTOXIGENICITY OF COAGULASE-NEGATIVE AND COAGULASE-POSITIVE STAPHYLOCOCCAL ISOLATES FROM FOOD POISONING OUTBREAKS IN MINAS GERAIS, BRAZIL:** *"The most frequently encountered enterotoxin genes were sea [Staphylococcal Enterotoxin A?] and seb [Staphylococcal Enterotoxin B?]."*

**4. DETECTION OF AGAR, BY ANALYSIS OF SUGAR MARKERS, ASSOCIATED WITH BACILLUS ANTHRACIS SPORES, AFTER CULTURE:** *"With appropriate choice of sugar marker and analytical procedure, detection of sugar markers for agar has considerable potential in microbial forensics."*

**5. BREAKING THE 'MUCUS BARRIER' WITH A NEW DRUG DELIVERY SYSTEM:** *"Chemical engineers from Johns Hopkins University have broken the "mucus barrier," engineering the first drug-delivery particles capable of passing through human mucus — regarded by many as nearly impenetrable — and carrying medication that could treat a range of diseases."*

**6. THE EFFECT OF OPINION CLUSTERING ON DISEASE OUTBREAKS:** *"There is growing evidence that belief systems, rather than access to vaccines, are the primary barrier to vaccination in such countries."*

# CB Daily Report

## *Chem-Bio News*

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### **GEL RELEASES DRUGS ON CUE**

Royal Society of Chemistry [UK]

August 14, 2008

"Many protein drugs, such as insulin and erythropoietin, are inactivated by the digestive enzymes in the gut, and so have to be regularly injected into the blood. Now a novel gel that delivers drugs in response to a chemical cue may help to make these daily jabs a thing of the past.

A team led by Wilfried Weber, based at the Swiss Federal Institute of Technology (ETH) Zurich's department of biosystems science and engineering, bound a part of the bacterial enzyme gyrase (GyrB) to polyacrylamide. They then used coumermycin, an antibiotic that can bind to two molecules of GyrB, to crosslink the polymers to form a hydrogel - a network of polymer chains that are insoluble in water.

When they added novobiocin - another antibiotic known to bind to GyrB - the antibiotic displaced coumermycin and dissolved the gel.

The researchers next incorporated vascular endothelial growth factor (VEGF), which is important for wound healing and the growth of blood vessels, into the hydrogels by binding it to polyacrylamide chains. The VEGF-containing hydrogels are able to release the growth factor in response to novobiocin. The team also showed that the hydrogels don't have any toxic effects on cultured cells."

The full article can be found at: <http://www.rsc.org/chemistryworld/News/2008/August/14080802.asp>

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### **STANFORD DEVELOP METHOD TO OVERCOME MULTIPLE DRUG RESISTANT DISEASES**

News-Medical.net

August 18, 2008

"The problem is well documented for antibiotics, although not confined to them. Chemotherapy drugs that were once highly effective when first used against a particular cancer now are often rendered near powerless when a patient's cancer resurges.

Even more devastating, when an organism develops resistance to one drug, it often becomes resistant to other drugs (known as multi-drug resistance), rendering not just one medication but a whole class of therapeutics useless against it.

But researchers at Stanford University have developed a method to get around one of the most common forms of resistance, thereby opening up some if not many resistant diseases to the reinvigorated fury of the medications that once laid them low. To do it, they took a tip from nature.

"Nature has developed all of this firepower for getting things into cells, and one of the ways is to create entities that are arginine-rich," said Paul Wender, the Bergstrom Professor of Chemistry at Stanford University. Arginine is an amino acid, the building block of proteins, and as such is found in virtually every cell in the human body, as well as other mammalian bodies."

"A paper describing the work is scheduled to be published next week in the online Early Edition of the Proceedings of the National Academy of Sciences. Wender's group collaborated with that of Chris Contag, a professor of pediatrics and of microbiology and immunology at Stanford's School of Medicine, who is a co-author on the paper."

The full article can be found at: <http://www.news-medical.net/?id=40782>

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## **A STUDY OF THE ENTEROTOXIGENICITY OF COAGULASE-NEGATIVE AND COAGULASE-POSITIVE STAPHYLOCOCCAL ISOLATES FROM FOOD POISONING OUTBREAKS IN MINAS GERAIS, BRAZIL**

Medical Device Law Weekly  
August 24, 2008

"The 15 coagulase-negative isolates were tested for the presence of *coa* and *femA* genes, which are known to be characteristic of *Staphylococcus aureus*. After testing for enterotoxin genes by polymerase chain reaction (PCR), the 30 selected isolates were tested for the presence of toxin by immunoassay. Seven of the coagulase-negative isolates amplified the *coa* gene and were subsequently reclassified as coagulase-positive. Twenty-one of 30 selected isolates had staphylococcal enterotoxin genes and most of these produced toxin as well. The most frequently encountered enterotoxin genes were *sea* [Staphylococcal Enterotoxin A?] and *seb* [Staphylococcal Enterotoxin B?]. Among eight coagulase-negative isolates, five had enterotoxin genes, all of which were found to have detectable toxin by immunoassay. The results from this study demonstrate that coagulase-negative as well as coagulase-positive staphylococci isolated from dairy products are capable of genotypic and phenotypic enterotoxigenicity."

"Furthermore, these data demonstrate that PCR is a sensitive and specific method for screening outbreak isolates regardless of coagulase expression."

The full article can be found at: (J.F. Veras, et. al., "A study of the enterotoxigenicity of coagulase-negative and coagulase-positive staphylococcal isolates from food poisoning outbreaks in Minas Gerais, Brazil". International Journal of Infectious Diseases, 2008; 12

(4):410-5). Link not available.

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## **DETECTION OF AGAR, BY ANALYSIS OF SUGAR MARKERS, ASSOCIATED WITH BACILLUS ANTHRACIS SPORES, AFTER CULTURE**

Medical Imaging Business Week

August 21, 2008

"Detection of small quantities of agar associated with spores of Bacillus anthracis could provide key information regarding its source or growth characteristics. Agar, widely used in growth of bacteria on solid surfaces, consists primarily of repeating polysaccharide units of 3,6-anhydro-l-galactose (AGal) and galactose (Gal) with sulfated and O-methylated galactoses present as minor constituents."

"Two variants of the alditol acetate procedure were evaluated for detection of potential agar markers associated with spores. The first method employed a reductive hydrolysis step, to stabilize labile anhydrogalactose, by converting to anhydrogalactitol. The second eliminated the reductive hydrolysis step simplifying the procedure. Anhydrogalactitol, derived from agar, was detected using both derivatization methods followed by gas chromatography-mass spectrometry (GC-MS) analysis. However, challenges with artifactual background (reductive hydrolysis) or marker destruction (hydrolysis) respectively lead to the use of an alternative agar marker. A minor agar component, 6-O-methyl galactose (6-O-M gal), was readily detected in agar-grown but not broth-grown bacteria. Detection was optimized by the use of gas chromatography-tandem mass spectrometry (GC-MS-MS)."

"With appropriate choice of sugar marker and analytical procedure, detection of sugar markers for agar has considerable potential in microbial forensics."

The full article can be found at: (D.S. Wunschel, et. al., "Detection of agar, by analysis of sugar markers, associated with Bacillus anthracis spores, after culture". Journal of Microbiological Methods, 2008; 74(2-3):57-63). Link not available.

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## **BREAKING THE 'MUCUS BARRIER' WITH A NEW DRUG DELIVERY SYSTEM**

Physorg

August 20, 2008

"Chemical engineers from Johns Hopkins University have broken the "mucus barrier," engineering the first drug-delivery particles capable of passing through human mucus — regarded by many as nearly impenetrable — and carrying medication that could treat a range of diseases."

"Lai explained that coating drug-loaded nanoparticles with an inexpensive polymer material

allows particles to pass through the mucus linings. With this mucus-penetrating mechanism, drugs could be delivered locally and with enhanced durations to treat diseases at mucosal surfaces."

"The team found that a polymer known as polyethylene glycol, or PEG, could coat individual drug particles and imbue them with the same properties as these mucus-breaching viruses. "PEG is one of the most widely used polymers for therapeutic applications," Lai explains. It's an FDA approved polymer that's been in use in humans for over 25 years – it's known to be very safe."

By encapsulating drugs in mucus-penetrating particles, drug companies could expand the realm of treatment options for many diseases. "For example, cervical cancer patients could locally apply chemo drugs inside mucus-penetrating particles, which would then deliver the drug locally in the female reproductive tract at efficient concentrations over prolonged periods of time, instead of delivering it everywhere else in the body. That could drastically reduce the side effects as well as prolong the presence of drugs at the target site," says Lai."

The full article can be found at: <http://www.physorg.com/news138454011.html>

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## **THE EFFECT OF OPINION CLUSTERING ON DISEASE OUTBREAKS**

Medical News Today

August 21, 2008

"Many high income countries currently experience large outbreaks of vaccine preventable diseases such as measles despite the availability of highly effective vaccines.

There is growing evidence that belief systems, rather than access to vaccines, are the primary barrier to vaccination in such countries. We use computer simulations to study how clusters of unvaccinated individuals can form due to opinion formation processes, and show how this can lead to a dramatic increase of disease outbreak probability.

Our results suggest that the current estimates of vaccination coverage necessary to avoid outbreaks of vaccine preventable diseases might be too low."

The full article can be found at: <http://www.medicalnewstoday.com/articles/118688.php>

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