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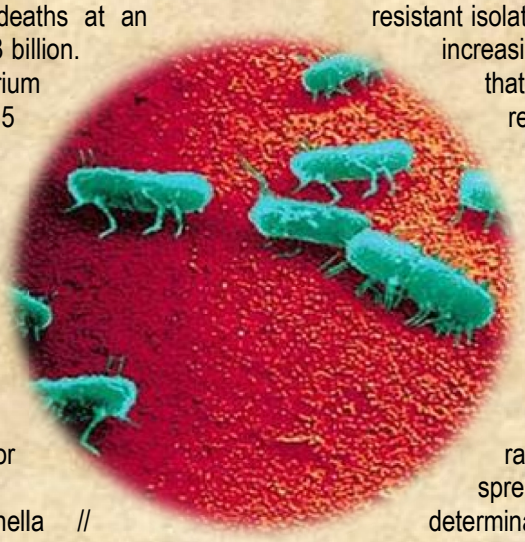
Tracking antibiotic-resistant strains of Salmonella from farm to fork

Source: http://www.homelandsecuritynewswire.com/dr20130830-tracking-antibioticresistant-strains-of-salmonella-from-farm-to-fork

In the United States, the various strains of Salmonella together are responsible for an estimated one million illnesses, 20,000 hospitalizations, and 400 deaths at an economic cost exceeding $3 billion. Salmonella Typhimurium accounts for at least 15 percent of clinically reported salmonellosis infections in humans nationally. The number of antibiotic-resistant isolates identified in humans is increasing steadily, suggesting that the spread of antibiotic-resistant strains is a major threat to public health.



Antibiotic-resistant Salmonella // Source: ahliwasir.com

Continuing research on Salmonella may enable researchers to identify and track strains of antibiotic resistant bacteria as they evolve and spread, according to researchers in Penn State's College of Agricultural Sciences.

Tracing the transmission of individual strains from agricultural environments to humans through the food system is difficult because of the rapid evolution of resistance patterns in these bacteria. Resistance patterns change so quickly that, until now, it has been impossible to determine where some highly resistant strains are coming from. A Penn State release reports that Michael DiMarzio, a doctoral candidate in food science working under the direction of Edward Dudley, associate professor and Casida Development Professor of Food Science, developed a method for identifying and tracking strains of Salmonella enterica serological variant Typhimurium as they evolve and spread.

Every year in the United States, the various strains of Salmonella together are responsible for an estimated one million illnesses, 20,000 hospitalizations, and 400 deaths at an economic cost exceeding $3 billion. Salmonella Typhimurium accounts for at least 15 percent of clinically reported salmonellosis infections in humans nationally. The number of antibiotic-resistant isolates identified in humans is increasing steadily, suggesting that the spread of antibiotic-resistant strains is a major threat to public health.

"Typhimurium infections have exhibited a gradual decline in susceptibility to traditional antibiotics, a trend that is concerning in light of this pathogen's broad host range and its potential to spread antibiotic resistance determinants to other bacteria," DiMarzio said. "Now more than ever, it is imperative to effectively monitor the transmission of Salmonella Typhimurium throughout the food system to implement effective control measures."

Building on recent research done in Dudley's lab, DiMarzio developed the new approach to identify antibiotic resistant strains of Salmonella Typhimurium focusing on virulence genes and novel regions of the bacteria's DNA known as clustered regularly interspaced short palindromic repeats, or CRISPRs. They report their results in the September issue of Antimicrobial Agents and Chemotherapy.

CRISPRs are present in many foodborne pathogens. The researchers demonstrated that CRISPR sequences can be used to identify populations of Salmonella with common antibiotic-resistance patterns in both animals and humans.

"Specifically, we were able to use CRISPRs to separate isolates by their propensity for resistance to seven common veterinary and human clinical antibiotics," DiMarzio said. "Our research demonstrates that CRISPRs are a novel tool for tracing the transmission of antibiotic-resistant

Salmonella Typhimurium from farm to fork."
DiMarzio found that several subtypes of Salmonella Typhimurium showed up repeatedly in the frozen collection of Salmonella samples taken from cows, pigs and chickens in Penn State's Animal Diagnostic Laboratory. In this case, researchers looked at eighty-our unique Salmonella Typhimurium isolates collected from 2008 to 2011.
"We know those strains are widely disbursed, and the thing they have in common is that they have noticeably higher levels of antibiotic resistance," he said. "So we examined clinical samples of Salmonella taken from humans, and it turned out that we see an overlap — the ones we see in humans are the ones we see a lot in animals. You would expect that, but it is confirmation that our method works."
DiMarzio noted that the researchers identified subsets of the overall Salmonella bacteria population that seem to be more prone to acquiring antibiotic resistance.
"Our challenge now is to learn what makes those strains different — why do some strains acquire resistance while others don't, even though both are circulating widely among animal populations?" he said. "We will need to know that to try to control them."

FDA to require imported food to be inspected at the source

Source: http://www.homelandsecuritynewswire.com/dr20130904-fda-to-require-imported-food-to-be-inspected-at-the-source

Each year about forty-eight million Americans get sick, some 128,000 are hospitalized, and about 3,000 dies from foodborne illnesses. Companies importing food into the United States will be held to higher safety and health standards if new proposed rules by the Food and Drug Administration (FDA) are passed. Under the proposal, the FDA would require importers to inspect food abroad before the food reaches American ports. Companies importing food into the United States will be held to higher safety and health standards if new proposed rules by the Food and Drug Administration (FDA) are passed. Under the proposal, the FDA would require importers to inspect food abroad before the food reaches American ports. For too long there have been too few inspectors facing a growing wave of food imports as retailers buy more of their food supplies from sources outside the United States. Currently only a small fraction of foreign-made foods is examined at ports of entry before distribution to grocery retailers and restaurants. The proposal calls for the FDA to outsource inspection work to firms with overseas food-sourcing operations. Food importers would need to ensure that their foreign suppliers comply with FDA safety rules, or that foreign regulations meet U.S health and safety requirements. The proposal contains accreditation procedures for third-party auditors who may inspect food suppliers.

The *San Francisco Chronicle* reports that according to federal officials, each year about forty-eight million Americans get sick, some 128,000 are hospitalized, and about 3,000 dies from foodborne illnesses. The new measures are designed to reduce food recalls and the outbreaks of foodborne illnesses.
As major retailers respond to consumer demand for a variety of foods and fresh produce available year-round, food imports retailers including Costco, Walmart, and Target have surged. The proposed changes are seen as proactive measures to target the sources of contaminated foods rather than respond after foodborne illnesses occur.
"We will continue to check food at our borders," Michael Taylor, the FDA's deputy commissioner for foods and veterinary medicine, said in a statement on the agency's Web site. "However, rather than relying almost entirely on FDA's investigators at the ports to detect

and respond to food safety problems, importers would - for the first time - be held accountable for verifying, in a manner transparent to FDA, that the food they import is safe."

The *Chronicle* notes that the industry generally supports the new measures since the FDA consulted with major food importers and conducted a cost-benefit analysis, says Michael Robach, vice president of corporate food safety, quality, and regulatory affairs for Cargill, a large U.S food importer with operations in fifty-five countries. "If you are doing the proper oversight, you're actually in the long term going to be saving yourself money," he says of costs associated with the inspection changes. Concerns do surround smaller importers without the infrastructure and supply-chain management that major food importers have to adjust to the new measures. The measures are open for public critique and feedback for ninety more days.

Populations at risk for severe or complicated influenza illness: systematic review and meta-analysis

BMJ 2013; 347 doi: http://dx.doi.org/10.1136/bmj.f5061 (Published 23 August 2013)

► **Source (full paper):** http://www.bmj.com/content/347/bmj.f5061

Abstract

Objective To evaluate risk factors for severe outcomes in patients with seasonal and pandemic influenza.

Design Systematic review.

Study selection Observational studies reporting on risk factor-outcome combinations of interest in participants with influenza. Outcomes included death, ventilator support, admission to hospital, admission to an intensive care unit, pneumonia, and composite outcomes.

Data sources Medline, Embase, CINAHL, Global Health, and the Cochrane Central Register of Controlled Trials to March 2011.

Risk of bias assessment Newcastle-Ottawa scale to assess the risk of bias. GRADE framework to evaluate the quality of evidence.

Results 63 537 articles were identified of which 234 with a total of 610 782 participants met the inclusion criteria. The evidence supporting risk factors for severe outcomes of influenza ranged from being limited to absent. This was particularly relevant for the relative lack of data for non-2009 H1N1 pandemics and for seasonal influenza studies. Limitations in the published literature included lack of power and lack of adjustment for confounders was widespread: adjusted risk estimates were provided for only 5% of risk factor-outcome comparisons in 39 of 260 (15%) studies. The level of evidence was low for "any risk factor" (odds ratio for mortality 2.77, 95% confidence interval 1.90 to 4.05 for pandemic influenza and 2.04, 1.74 to 2.39 for seasonal influenza), obesity (2.74, 1.56 to 4.80 and 30.1, 1.74 to 2.39), cardiovascular diseases (2.92, 1.76 to 4.86 and 1.97, 1.06 to 3.67), and neuromuscular disease (2.68, 1.91 to 3.75 and 3.21, 1.84 to 5.58). The level of evidence was very low for all other risk factors. Some well accepted risk factors such as pregnancy and belonging to an ethnic minority group could not be identified as risk factors. In contrast, women who were less than four weeks post partum had a significantly increased risk of death from pandemic influenza (4.43, 1.24 to 15.81).

Conclusion The level of evidence to support risk factors for influenza related complications is low and some well accepted risk factors, including pregnancy and ethnicity, could not be confirmed as risks. Rigorous and adequately powered studies are needed.

Worries grow about Syria's biological weapons capabilities, intentions

Source: http://www.homelandsecuritynewswire.com/node/43757

The debates among experts in Western and Middle Eastern intelligence services and militaries about the use of chemical weapons by the Assad regime revolve around how many times Assad has used chemical weapons, not whether such weapons were used. The U.K. and French intelligence services say they have evidence of about fifteen instances of chemical weapons employment, while Israel and the United States say they can prove that chemical weapons were used eight times by Assad – once on 19 December 2012, four times in March this year, twice in May, and the last, headline-grabbing use on 21 August.

Neighbors of Syria have become increasingly alarmed – and, in private, have expressed their anxiety in discussions with the United States – about another illicit Syrian WMD program: biological weapons.

The *Washington Post* reports that Syria has had an active biological weapons research program for more than thirty years, and the worry now is that the beleaguered Assad regime would launch an effort to make a biological weapon.

Syria's bioweapons program may have been largely inactive since the mid-1980s, but weapons specialists and Middle East experts say that those early research efforts are likely to have created the key ingredients for a weapon, including different types of deadly bacteria and viruses and the equipment required to convert them into deadly powders and aerosols.

The readiness of the Assad regime to use one proscribed weapon – chemicals — has led to growing unease among Syria's neighbors that the regime may not find it too difficult to violate other weapon-related taboos.

Top intelligence officials in two Middle East countries told the *Post*'s Walter Pincus said they have been considering the possibility for biological weapons use by Syria, especially in the context of retaliation in the event of a military strikes against Syria.

Biological weapons could give the Assad regime an effective means of retaliation because, if the weapon is well-designed, the lethal contents would spread easily without leaving tell-tale signs about the origin of the attack – or even evidence that there has been an attack.

"We are worried about sarin, but Syria also has biological weapons, and compared to those, sarin is nothing," said a senior Middle Eastern official, who like several others interviewed by Pincus, agreed to discuss intelligence assessments on the condition of anonymity. "We know it, and others in the region know it. The Americans certainly know it."

After the Second World War there were a dozen or so countries with active biological weapons research programs, but by the late 1970s most have ended the effort. Two notable exceptions were Saddam Hussein's Iraq and Assads' Syria ("Assdas" as in Hafez and Bashar).

The *Post* notes that the regime as much as admitted its biological weapon capability in a July 2012 statement made by Foreign Ministry spokesman, Jihad Makdissi, in a televised interview. In response to a question, he said that the regime would never use "any chemical and biological weapons" inside Syria, adding that the Syrian military was safeguarding "all stocks of these weapons."

Earlier this year, the Office of the Director of National Intelligence said in a report for Congress that Syria possesses a "longstanding biological weapons program," adding that parts of it "may have advanced beyond the research and development stage, and may be capable of limited agent production."

Representative Mike Rogers (R-Michigan), chairman of the House Permanent Select Committee on Intelligence, told Pincus that "We know that they went at least as far as research and development…. That means they're far enough along to have capabilities. It doesn't take a huge leap to get from there to having the ability to weaponize or finding some other way to deliver."

In 2001, a declassified CIA assessment asserted that it was "highly probable" that Syria was developing an "offensive BW capability."

The *Post* notes that U.S. assessments have frequently cited the Scientific Studies and Research Center in Damascus, a military-run laboratory linked to covert

programs for research on chemical and nuclear weapons.

A 2008 study of Syria's unconventional weapons programs by the Washington-based Center for Strategic and International Studies concluded that the Syrian military had developed "probable production capacity for anthrax and botulism, and possible other agents." The report added that delivery systems for such weapons were within reach of Syria's armed forces, which already employs missiles and rockets tipped with warheads.

"So is the use of proxy or covert delivery," stated the report, written by Anthony Cordesman, one of the center's strategic analysts.

Jill Bellamy van Aalst, a scientist and a biodefense consultant to NATO and the European Union, says that recent – and massive – Syrian government investments in the country's pharmaceutical industry could have considerably augmented the country's biological weapons program, since much of the equipment acquired by Syria's military laboratories in recent years is "dual-use" equipment which may be used for weapons or legitimate research.

Van Aalst, who has studied Syria's weapons facilities for a decade as part of her research for a book, told Pincus that the country's bioweapons program, whatever its size, is capable of serious harm.

She said that many of the basic elements of a biological weapons program have been in place for years, including a full complement of lethal human and animal strains, from neurotoxin producers such as botulinum to the family of orthopox viruses such as camelpox and cowpox, both related to the microbe that causes smallpox.

"You don't stockpile biological weapons anymore, because today it's all about production capacity — and in Syria the production capacity is quite substantial," van Aalst said. "The dual-use nature makes it very cost-effective. In down times, you can use the equipment for public health purposes, knowing you can ramp it up at any time. These are very agile programs."

Ricin detection sensitivity improved up to 1,000 times

By Ali Karami

Source:http://www.linkedin.com/groupAnswers?viewQuestionAndAnswers=&discussionID=5792117531162468355&gid=3711808&trk=eml-anet_dig-b_nd-pst_ttle-cn&fromEmail=&ut=1WxijUBVYzdlY1

Warfighters, first-responders and front line detection personnel will be able to better protect themselves as well as the American public, by improving their ability to detect even miniscule levels of biothreat agent pathogens and their toxins, thanks to work funded by DTRA CB/JSTO.

The research yields enhanced abilities to detect and diagnose bio-threat toxins, such as ricin, at significantly lower concentrations than previously demonstrated - a 100 to 1,000 times improvement.

The DTRA Ruggedized Antibody Program project, funded by the Diagnostics, Detection, and Disease Surveillance Division, recently demonstrated greatly enhanced capabilities in detecting ricin toxin using a combination of recombinant anti-ricin single domain antibodies (sdAbs) developed in DTRA-funded work at the Naval Research Laboratory (NRL) and a novel enabling technology called ultrasensitive single-molecule array (SiMoA) platform, developed by Dr. David Walt at Tufts University.

Together this new technique is 100 times more sensitive than using the conventional particle-based multiplex immunoassay (Luminex) and 1,000 times more sensitive than the widely used enzyme-linked immunosorbent assays (ELISA).

This technology has demonstrated exquisite analytical and clinical sensitivity, as well as a broad dynamic range. The combination of these two technologies will robustly increase the Department of Defense's diagnostic armamentarium.

This could lead to warfighters being able to detect lower levels of the toxin, therefore decreasing false negatives in environmental samples and earlier discovery in the course of clinical intoxication.

SdAbs are recombinant ligand binding antibody fragments derived from the unusual structure of native

antibodies found in camels and llamas. These unique heavy chain binding elements offer many desirable properties such as their small size (~15 kDa) and thermal stability, which makes them attractive alternatives to conventional monoclonal antibodies.

The fact that they can be rationally-selected, produced in mass quantity by standard recombinant protein expression manufacturing methods, and have potential to eliminate the cold-chain for these reagents makes them highly attractive binding molecules.

In other words, sdAbs provide more uniform, consistent production and function, while making them cheaper and more stable than conventional antibodies and potentially could eliminate the need for refrigeration of these reagents – a big plus for forward-based troops or first-responders who can keep the reagents at ambient temperature.

One limitation of sdAbs to date has been that, while the analytical sensitivity has been sufficient for most environmental detection, the use of these novel binders for diagnostic targets in clinical sample matrices was difficult due to the inability to consistently produce high affinity binders.

SiMoAs are based on binding single protein molecules to capture antibody-coated magnetic nanoparticle beads to form sandwich antibody complexes. After protein binding and immunocomplex formation, the beads are allowed to settle into femtoliter-sized reaction wells. These small volume wells are sized to allow only a single bead to localize in each well. The wells are sealed with a fluorogenic substrate.

Each immunocomplex is labeled with an enzymatic reporter, which generates a high local concentration of fluorescent molecules in the femtoliter wells. The confinement of the fluorescent product provides increased sensitivity over conventional fluorescent ELISA where the fluorescent product generated diffuses into a large volume.

Ali Karami is Medical Biotechnologist (molecular Biologist) at Research Center of Molecular Biology, Tehran, IR

Pentagon Seeks to Design Virus-Fighting Protein 'Cocktails'

Source: http://www.nextgov.com/health/2013/10/pentagon-seeks-design-virus-fighting-protein-cocktails/71372/

The U.S. Defense Department is weighing a new search for immune-protein "cocktails" it hopes will protect humans against Ebola and other deadly, weapon-usable viruses.

The Pentagon two weeks ago invited scientists to submit research proposals for designing "monoclonal antibodies" that could protect against Ebola and Marburg, as well as "alphaviruses" such as Venezuelan equine encephalitis.

Pentagon planners have been turning to antibodies as a possible tool because "no easy and quick fix" for such agents has emerged from efforts to develop vaccines or traditional antiviral treatments, said Gigi Gronvall, a senior associate with the Center for Health Security at the University of Pittsburgh Medical Center.

The early-stage research now under consideration ideally would lead to single-shot treatments capable of guarding troops for months from multiple virus types, the Defense Threat Reduction Agency said in a Sept. 18 solicitation. DTRA officials welcomed researchers to propose "'cocktails' that may enable cross-protection against multiple species of virus."

The emphasis on "cocktails" makes the latest DTRA proposal particularly notable, because several studies suggest that mixes of several antibodies can be particularly effective in fighting pathogens, Gronvall told *Global Security Newswire* in a telephone interview. Antibodies hit their targets with such specificity that a treatment with multiple immune proteins can help account for slight variations between invading microbes.

Monoclonal antibodies have been in use since the 1980s to treat cancer and immune-linked ailments such as rheumatoid arthritis, but their use against infectious pathogens has lagged, according to a DTRA-sponsored report co-authored by Gronvall on the technology's biodefense potential.

The United States last year licensed the first inhalation anthrax treatment to use the technology, which involves

creating massive quantities of a single immune "antibody." The human body naturally generates such proteins, each of which is designed to mark a specific pathogen or toxin for elimination by other immune-system components.

One antibody cocktail grown in modified tobacco plants showed promising potency against Ebola infections specifically, according to a study published in August.

"There have been a lot of changes in the way that monoclonal antibody technologies have evolved over the last several years, and it makes monoclonal antibodies a very nice piece of their approach to medical countermeasures," Gronvall said.

The latest DTRA Broad Agency Announcement seeks proposals for studies no longer than one year, with a cost no greater than $500 million. The filing deadline is Oct. 16.

Secret Botulism Paper Published

Source: http://www.the-scientist.com/?articles.view/articleNo/37936/title/Secret-Botulism-Paper-Published/#!

In a publishing first, the sequence of a newly discovered protein is not divulged in papers announcing the finding. Researchers at the California Department of Public Health in Sacramento discovered the

protein, a new type of the extremely dangerous botulinum toxin, lurking in the feces of a child who displayed the symptoms of botulism. They published their findings in two reports on the website of *The Journal of Infectious Diseases*, but absent from either paper was the DNA sequence of the protein, the eighth form of botulinum toxin recovered from the bacterium *Clostridium botulinum*. The move represents the first time that a DNA sequence has been omitted from such a paper. "Because no antitoxins as yet have been developed to counteract the novel *C. Botulinum* toxin," wrote editors at *The Journal of Infectious Diseases*, "the authors had detailed consultations with representatives from numerous appropriate US government agencies."

These agencies, which included the Centers for Disease Control and Prevention and the Department of Homeland Security, approved publication of the papers so long as the gene sequence that codes for the new protein was left out. According to *New Scientist*, the sequence will be published as soon as antibodies are identified that effectively combat the toxin, which appears to be part of a whole new branch on the protein's family tree.

Syria: Could Al-Qaeda Have Access To Biological Weapons?

By The Henry Jackson Society

Source: http://www.eurasiareview.com/19102013-syria-al-qaeda-access-biological-weapons/

While the removal of chemical weapons in Syria is currently the focus of the world's attention, experts from the Henry Jackson Society (HJS) have warned of the dangers of overlooking the potential development of biological weapons, and the threat that could be posed if al-Qaeda gains access to biological WMDs.

In a new briefing, the HJS has outlined key points that suggest terrorist factions in Syria could access biological pathogens, while giving a detailed background on AQ's biological warfare ambitions. Dr Jill Bellamy van Aalst, a former EU and NATO bio-defence consultant, and HJS Director of Research Olivier Guitta, have prepared the briefing and warned that Assad's biological program could pose a greater risk than the chemical stockpiles currently being handed over to authorities.

They find in their report:

- Al Qaeda's affiliate in Syria, Al Nusrah, may have acquired access to biological pathogens or weaponized agents, either of

which would pose a threat to the international community.

- The Syrian civil war has left sections of the bio-pharmaceutical infrastructure destroyed, and looting of labs has been observed, which could indicate that Assad is losing command and control over one of the most dangerous classes of weapons remaining in his weapons of mass destruction (WMD) arsenal.
- Should al Qaeda acquire sections of Assad's BW program, it has the competence and expertise to weaponize and deploy agents.
- Documents found in Afghanistan, in 2001, ostensibly revealed that al-Qaeda was doing research on using botulinum toxin to kill 2,000 people.
- On January 6, 2009 a number of terrorists died of plague in one of al-Qaeda in the Islamic Maghreb (AQIM) training camps in Tizi Ouzou. Reportedly, 50 terrorists had been diagnosed with the plague, 40 of whom already died.
- Intelligence sources suggest that in several countries, notably Morocco, Algeria, Sudan and Mauritania, AQ is training operatives in biological and chemical weapons and has successfully inserted terrorists into Europe through application processes for refugee status.

Dr. Bellamy van Aalst said, "Establishing the extent to which Assad may have developed biological WMDs is extremely difficult, given that their production is indistinguishable from benign biological lab processes."

"But this is certainly a risk to which we should not turn a blind eye. If Assad has been developing biological weapons, as the evidence suggests, and if those weapons fall into the hands of extremists, global health security could be in grave danger," van Aalst noted.

HJS Director of Research Olivier Guitta added that Syria has just recently joined the Chemical Weapons Convention, "which is clearly a welcome step in the right direction, and there is no underestimating the importance of removing chemical weapons so they can never again be used against the Syrian population."

According to Guitta, "However in making this progress, we must not lose sight of the potential risk that Assad's biological weapons program could still pose, not least because of the risk of biological WMDs falling into the control of extremists in Syria."

THE 2009 ALGERIAN INCIDENT:

On January 6, 2009 the Algerian newspaper *Echorouk* reported that a number of terrorists had died of plague in one of al-Qaeda in the Islamic Maghreb (AQIM) training camps in Tizi Ouzou.[7] Another Algerian newspaper, *Ennahar*, affirmed that 50 terrorists had been diagnosed with the plague, 40 of whom already died.[8]

1. Algerian authorities were totally silent at the time. Our trusted sources also declined to comment about the veracity of the story. One can suspect that Algerians authorities were not too happy about the story being confirmed by American sources. Indeed the *Washington Times* confirmed through a senior U.S. intelligence official that an incident had taken place at an AQIM training camp that had to be shut down as a result.[9]

About the authors:

***Dr Jill Bellamy van Aalst**, CEO of Warfare Technology Analytics, is a chemical and biological weapons expert with specialist knowledge of Middle East bio-warfare and WMD programmes. Dr Bellamy van Aalst has served as a bio-defence consultant for government and non-governmental organisations, including Security and Defence Agenda, an EU/NATO supported defence forum in Brussels. She was previously a special adviser to strategic affairs with Kenna, Long and Aldridge in Washington DC, working within their bio-defence practice to promote Bio Shield legislation in the US Congress and NATO HQ.*

Olivier Guitta is the Director of Research at the Henry Jackson Society, responsible for setting the strategic agenda for the research department and overseeing the Society's academic focus, as well as conducting his own research on geopolitics in the MENA region. He is an expert on security and counter-terrorism, having briefed the European Union, the United States Congress and NATO, as well as US presidential candidates, SOCOM and Europol. He is a regular speaker at international security conferences and has lectured at the National Defense University and the Joint Special Operations University.

▶ **Read the full paper at:** http://henryjacksonsociety.org/wp-content/uploads/2013/10/HJS-briefing-AQs-WMD.pdf

Iranian National Center for Health Data Opened

By Ali Karami

Source: LinkedIn Medical/Hospital CBRNE Defence Group

National Center for Health Data "where the collection, storage and processing of data and information in various areas of the health system, the location of the headquarters of the Ministry of Health and Medical Education credit amounted to 100 billion rials ($5.000.000) has been made.

This advance medical database will collect all medical and health information across the nation and will be available to ministry of health and medical professional to use it for upgrading medical services and research purposes.

Ali Karami is Medical Biotechnologist (molecular Biologist) at Research Center of Molecular Biology, Tehran, Iran.

RTI unveils a 'Google Earth' of its own with mapping with 'synthetic population viewer'

Source: http://wraltechwire.com/rti-unveils-a-google-earth-of-its-own-with-mapping-with-synthetic-population-viewer-/13008241/

Fear - or planning to help prevent fear and mass infections - led to its creation. But the end result is a new dimension in mapping, and the web-based tool was created in RTP at RTI International.

Think of it as Google Maps - but more detailed and concerned with privacy.

Funded by the federal government as part of a bioterrorism defense program, RTI developed the "synthetic population viewer" provides household data across the country down to "microcommunities."

The interactive, incredibly detailed viewer is based on the American Community Survey conducted by the federal government between 2005-2009 and includes data from more than 112 million households across all 50 states plus Washington, D.C.

RTI unveiled the project Thursday (Oct 10, 2013)

"This new era of complex, synthetic household data enables fine-scale, multidimensional demographic patterns and microcommunities to emerge from simple-to-use, web-based maps," said Bill Wheaton, director of RTI's Geospatial Science and Technology program. "It's a rich tool for anyone interested in exploring the amazing diversity of human household populations in the U.S."

How detailed is it?

"The data represent the reality of the U.S. household population very well. By representing each and every household as a point on the map, a wealth of complex patterns becomes apparent," Wheaton said.

However, he pointed out that the map's creators were concerned with privacy/

"In order to protect privacy, the interactive map doesn't show actual households in their exact locations like Google Earth," he said. "Nonetheless, the data represent real households in reasonably accurate detail, enabling the map to show complex population distributions."

RTI noted in the announcement that users of the web site can "see stark racial boundaries, subtle shifts in income, and intricate patterns of race, age, household size and income for any location in the United States."

Access to the map is free

RTI believes it will be used by geographic information service professionals to students to people "simply interested in looking at population patterns."

The project was funded as part of the Models of Infectious Disease Agent Study (known as MIDAS), which is a bioterrorism defense initiative.

▶ **Visit the new viewer at:** http://portaldev.rti.org/10_Midas_Docs/SynthPop/portal.html

Innovative device speeds up food-pathogen detection

Source: http://www.homelandsecuritynewswire.com/dr20131015-innovative-device-speeds-up-food pathogen-detection

Researchers have developed a system that concentrates foodborne salmonella and other pathogens faster than conventional methods by using hollow thread-like fibers that filter out the cells, representing a potential new tool for speedier detection.

A Purdue University release reports that the machine, called a continuous cell concentration device, could make it possible to routinely analyze food or water samples to screen for pathogens within a single work shift at food processing plants.

"This approach begins to address the critical need for the food industry for detecting food pathogens within six hours or less," said Michael Ladisch, a distinguished professor of agricultural and biological engineering at Purdue University. "Ideally, you want to detect foodborne pathogens in one work shift, from start to finish, which means extracting the sample, concentrating the cells and detection."

A report from the Centers for Disease Control and Prevention (CDC) indicates a lack of recent progress in reducing foodborne infections and highlights the need for improved prevention.

Although many foodborne illnesses have declined in the past fifteen years, the number of laboratory-confirmed salmonella cases did not change significantly in 2012 compared with 2006 to 2008.

The first step in detecting foodborne pathogens is concentrating the number of cells in test samples. The new system enables researchers to carry out the concentration step within one hour,

compared to a day for the standard method now in commercial use, said Ladisch, also a professor of biomedical engineering and director of Purdue's Laboratory of Renewable Resources Engineering (LORRE).

Findings are detailed in a research paper to appear in November in the journal *Applied and Environmental Microbiology*.

Findings showed the system was able to concentrate inoculated salmonella by 500 to 1,000 times the original concentration in test samples. This level of concentration is required for accurate detection. Another finding showed the system recovered 70 percent of the living pathogen cells in samples, Ladisch said.

"This is important because if you filter microorganisms and kill them in the process that's self-defeating," he said. "The goal is to find out how many living microorganisms are present."

The release notes that the machine was used to concentrate cells in a sample of chicken meat. The sample is first broken down into the consistency of a milkshake and chemically pretreated to prevent the filtering membranes from clogging. The fluid is then passed through twelve hollow-fiber filters about 300 microns in diameter that are contained in a tube about the size of a cocktail straw.

The filtering process continues until pathogens if present are concentrated enough to be detected.

The technique, developed by researchers from Purdue's colleges of Engineering and Agriculture, could be performed during food processing or vegetable washing before the products are shipped.

The U.S. Department of Agriculture will test the system, which is not yet ready for commercialization.

One feature that could make the machine practical for commercial application is that it can be quickly cleaned between uses. The tubes are flushed with sodium hydroxide and alcohol.

Purdue has filed a patent application for the concept.

The research is funded by the U.S. Department of Agriculture, Purdue's Agricultural Research Programs and Center for Food Safety Engineering, and the Department of Agricultural and Biological Engineering.

— Read more in Xuan Li et al., "Rapid Sample Processing for Foodborne Pathogen Detection via Crossflow Microfiltration," Applied and Environmental Microbiology *(6 September 2013)*

Discovery points way to treatment of lethal toxin botulism

Source: http://www.homelandsecuritynewswire.com/dr20131014-discovery-points-way-to-treatment-of-lethal-toxin-botulism

Botulinum neurotoxins are produced by *Clostridium botulinum* and cause the possibly

fatal disease botulism, which impedes nerve cells' ability to communicate with muscles and can lead to paralysis and respiratory failure. The botulinum toxin has also been identified as a potential biological weapon against a civilian population. Scientists have decoded a key molecular gateway for the toxin that causes botulism, pointing the way to treatments that can keep the food-borne poison out of the bloodstream.

U.S. and German scientists have decoded a key molecular gateway for the toxin that causes botulism, pointing the way to treatments that can keep the food-borne poison out of the bloodstream.

Study leaders Rongsheng Jin, associate professor of physiology & biophysics at UC Irvine, and Andreas Rummel of the Institute for Toxicology at Germany's Hannover Medical School created a three-dimensional crystal model of a complex protein compound in the botulinum neurotoxin.

This compound binds to the inner lining of the small intestine and allows passage of the toxin into the bloodstream.

A UC Irvine release reports that the 3-D structure — shaped much like the Apollo lunar landing module — lets the researchers identify places on the surface of the complex protein that enable it to dock with carbohydrates located on the small intestine's interior wall. In tests on mice, they found that certain inhibitor molecules blocked the botulism compound from connecting to these sites, which prevented the toxin from entering the bloodstream.

Botulinum neurotoxins are produced by *Clostridium botulinum* and cause the possibly fatal disease botulism, which impedes nerve cells' ability to communicate with muscles and can lead to paralysis and respiratory failure. The botulinum toxin has also been identified as a potential biological weapon against a civilian population.

"Currently, there is no efficient countermeasure for this toxin in case of a large outbreak of botulism," Jin said. "Our discovery provides a vital first step toward a pharmaceutical intervention at an early point that can limit the toxin's fatal attack on the human body."

Study results appear online in the journal *PLOS Pathogens*.

Jin added that his work opens the door to further development of preventive treatments for botulism. At the same time, the molecular gateway for the lethal toxin could be exploited for alternative applications, such as the oral delivery of protein-based therapeutics.

The research was supported in part by the National Institute of Allergy & Infectious Diseases, the German Research Foundation, the Swiss Federal Office for Civil Protection, and the U.S. Department of Agriculture CRIS project.

— Read more in Kwangkook Lee et al., "Structure of a Bimodular Botulinum Neurotoxin Complex Provides Insights into Its Oral Toxicity," PLOS Pathogens *9, no. 10 (10 October 2013*)

New MERS virus + Hajj: Maybe not a recipe for disaster

Source: http://www.nbcnews.com/health/new-mers-virus-hajj-maybe-not-recipe-disaster-8C11373353

It seems like the perfect storm — millions of people from all over the world, descending on a few cities all in the space of a few weeks, just as a deadly and mysterious new virus is spreading.

But global health officials say they are not especially worried that the annual Hajj pilgrimage in Saudi Arabia will help spread the MERS coronavirus when it starts next week. That's even though this virus has demonstrated that it's only a single flight away from any city in the world, and even though it's an especially deadly virus.

Why not? MERS hasn't yet acquired the ability to spread easily from one person to another.

And while U.S. health officials are keeping an eye out for it, they're not especially concerned, either. "We think the risk

is low," says Dr. David Trump, state epidemiologist for Virginia.

Watching out for the virus across the United States this year may fall mostly on the shoulders of state health officials such as Trump, as the government shutdown has closed most activities of the Centers for Disease Control and Prevention.

The Middle East respiratory syndrome (MERS) virus emerged in Saudi Arabia about a year ago. It's a coronavirus, in the same family as the severe acute respiratory syndrome (SARS) virus that caused an epidemic in 2003 and infected around 8,000 people and killed more than 700 of them before it was stopped.

So far, MERS has been confirmed in 136 people and it's killed 58 — making it a highly deadly virus. Most, but not all, victims have been old or weak or sick in some way — many with kidney disease or diabetes. But healthy people have been killed, too.

The World Health Organization says it has the potential to cause a pandemic. It's been seen mostly in Saudi Arabia, centered around Riyadh, but has spread to France, Germany, Britain, Jordan, Qatar and other countries.

And now an estimated 3 million people are about to descend on Saudi Arabia for the Hajj – the mass pilgrimage to the city of Mecca that devout Muslims try to undertake at least once in their lives. The Centers for Disease Control and Prevention estimates that 11,000 Americans make the trip every year.

This year, it takes place Oct. 13-18.

For a new virus or other microbe to cause a pandemic, it has to spread easily and efficiently from one person to another. MERS doesn't do that. Some people have infected others, but most new infections are still a bit mysterious – and at least one study suggests people are being infected directly by animals.

Saudi health officials are taking precautions, however. The Saudi Ministry of Health has suggested that people over 65, children under 12, pregnant women and people with chronic conditions such as diabetes and kidney failure stay home this year.

Because millions of people are crowded into close quarters, the Saudi Ministry of Health requires all pilgrims to be vaccinated against meningitis. CDC recommends that people make sure other vaccines are up to date -- the Hajj comes at the beginning of flu season, also.

"CDC also recommends vaccination against hepatitis A and B and typhoid for travel to Saudi Arabia, and all travelers, regardless of destination, should be up-to-date on routine vaccines (such as measles and pertussis)," the agency advises.

CDC also advises travelers to the Hajj to take other precautions, like washing their hands a lot, to protect against all sorts of infectious diseases.

State health officials say they're already watching for signs anyone traveling from the Middle East might have MERS. Trump says there have been several false alarms in Virginia, which has a large population of people who travel frequently to the Middle East.

"We certainly have worked to make sure physicians know what to think about and who to call if they feel they have someone who has an illness compatible with the MERS coronavirus," Trump said.

The same goes for Maryland, another state with a large international airport and frequent travel to the Middle East.

"We have alerted physicians and hospital infection prevention and control practitioners to be vigilant for persons who meet the Centers for Disease Control and Prevention's criteria for a MERS 'patient under investigation' or PUI, and advised them to immediately report all possible cases," said Karen Black, a spokesperson for Maryland's health department.

"We have also provided information about isolation and specimens to be collected for diagnostic testing."

WHO does not advise special screening at airports for travelers coming back from the Hajj and doesn't recommend any travel or trade restrictions.

Virus experts say they've linked MERS to bats, but say it's unlikely bats are directly infecting people. Another animal may be involved. SARS was eventually traced to an animal called a civet, sold in wild animal markets in China.

Drug-resistant Salmonella outbreak in seven states

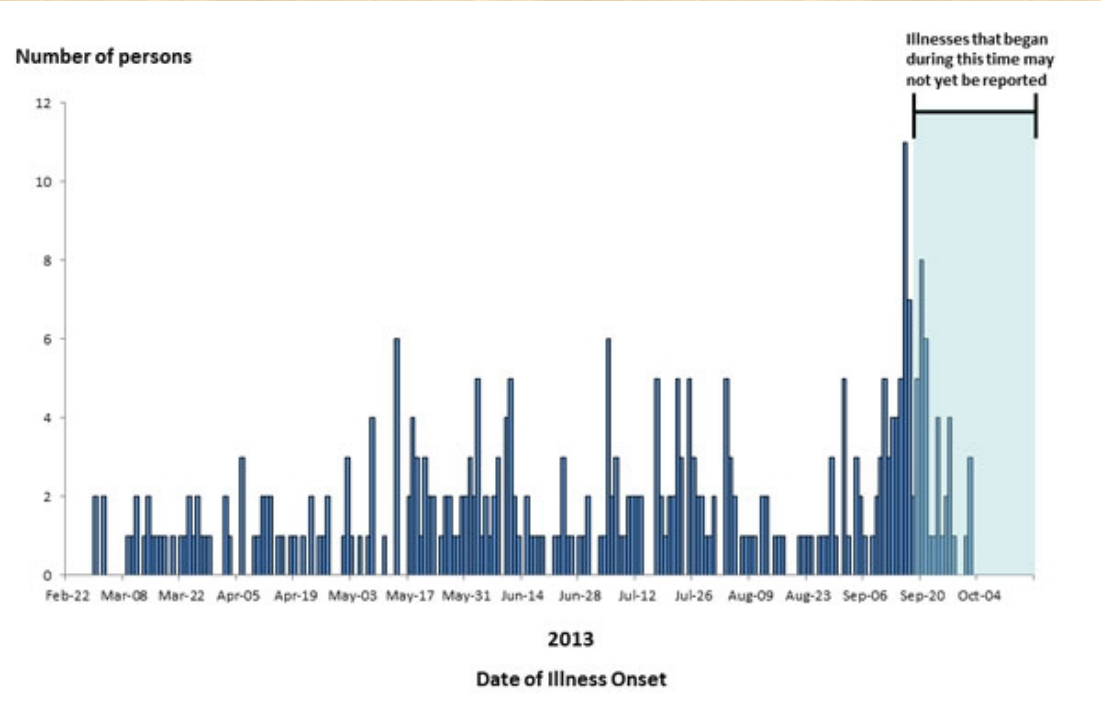
Source: http://www.homelandsecuritynewswire.com/dr20131009-drugresistant-salmonella-outbreak-in-seven-states

The Centers for Disease Control and Prevention (CDC) said it was collaborating with public health and agriculture officials in many states and the U.S. Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS) to investigate a multistate outbreak of *Salmonella* Heidelberg infections. Public health investigators are using DNA "fingerprints" of *Salmonella* bacteria obtained through diagnostic testing with pulsed-field gel electrophoresis, or PFGE, to identify cases of illness that may be part of this outbreak. They are using data from PulseNet, the national subtyping network made up of state and local public health laboratories and federal food regulatory laboratories that performs molecular surveillance of foodborne infections.

Seven strains of *Salmonella* Heidelberg bacteria have been identified as being linked to this outbreak. Four of these strains are rarely reported to PulseNet. The other three strains are more common, with several ill persons infected with each strain reported to CDC monthly. The DNA fingerprints of the *Salmonella* Heidelberg bacteria associated with the current outbreak include the strain that was also associated with a multistate outbreak of Salmonella Heidelberg linked to Foster Farms brand chicken during 2012-13.

The outbreak strains of *Salmonella* Heidelberg are resistant to several commonly prescribed antibiotics. This antibiotic resistance may be associated with an increased risk of hospitalization or possible treatment failure in infected individuals.

CDC says that as of 7 October 2013, a total of 278 individuals infected with the outbreak strains of Salmonella Heidelberg have been reported from seventeen states. Most of the ill persons (77percent) have been reported from California. The number of ill persons identified in each state is as follows: Alaska (2), Arkansas (1), Arizona (11), California (213), Colorado (4), Connecticut (1), Florida (1), Hawaii (1), Idaho (2), Michigan (2), North Carolina (1), Nevada (8), Oregon (8), Texas (5), Utah (2), Washington (15), and Wisconsin (1).



Among 274 persons for whom information is available, illness onset dates range from 1 March to 24 September 2013. Ill persons range in age from <1 year to 93 years, with a median age of 20 years. Fifty-one percent of ill persons are male. Among 183 persons with available

information, 76 (42 percent) reported being hospitalized. No deaths have been reported.

The outbreak can be visually described with a chart showing the number of people who became ill each day or week. This chart is called an epi curve. Illnesses that occurred after 1 September 2013 might not be reported yet due to the time it takes between when a person becomes ill and when the illness is reported. This takes an average of two to three weeks. See more details in *SalmonellaOutbreak Investigations: Timeline for Reporting Cases*.

Foster Farms has issued a statement saying it was cooperating with CDC and other federal and state health officials.

NPR reports that news of the outbreak has received a lot of attention because it comes during the federal government shutdown. There is a fear that no one is on the job at a critical time. USDA says, however, that its work has not been slowed down since its inspectors and investigators have stayed on the job.

As NPR has reported, the CDC unit that tracks outbreaks has been working with less than half its normal staff. To help handle the current outbreak, the agency told NPR it has called back about thirty furloughed workers, including ten who work in the foodborne division.

"This is the kind of thing that you've got to get information into consumers' hands," Caroline Smith DeWaal, food safety director for the Center for Science and Public Interest, told NPR.

She says that since the communications staffs of both CDC and USDA are working at reduced capacity, it is a concern. "The agency's ability to push out the information is a lot more limited than it would be otherwise."

Research on computer modeling for emergency preparedness featured in special journal issue

Source: http://www.medicalnewstoday.com/releases/266388.php

Cutting-edge research on computational modeling of public health emergencies and simulations of the potential response, brought together by the University of Pittsburgh Graduate School of Public Health, is featured in a special issue of the Journal of Public Health Management and Practice.

The September/October special issue features nearly a dozen studies sparked by innovative collaborations among infectious disease specialists and industrial engineers, epidemiologists and geospatial engineers, political scientists and statisticians at last year's "Dynamics of Preparedness: A Public Health Systems Conference."

"Such interdisciplinary research collaborations can be challenging, but also very rewarding when it comes to protecting public health," said Margaret Potter, J.D., M.S., guest editor of the special issue and director of the Center for Public Health Practice at Pitt Public Health. "Having now invested in forming these partnerships, it's time to invest in sustaining them."

The special issue of the journal is available online for free to the public. This open access was provided by Pitt Public Health's Models of Infectious Disease Agent Study (MIDAS) National Center of Excellence, funded by the National Institute of General Medical Sciences at the National Institutes of Health.

"At Pitt Public Health, we are at the forefront of computer modeling to address a variety of public health questions," said Donald S. Burke, M.D., Pitt Public Health dean and UPMC-Jonas Salk Chair of Global Health, who co-authored an article in the special issue. "Such work will facilitate better planning and preparedness for a variety of threats to public health, including natural and man-made disasters, as well as important societal problems, such as crime, obesity and smoking. We intend to make modeling and

simulation a regular, day-to-day decision support tool for public health officials."

Pitt's Public Health Dynamics Laboratory is developing such tools, including a sophisticated database for gathering and analysis of public health data, a framework for modeling how the actions and interactions of different groups affect the entire population, and a publicly accessible web service that translates epidemiological information onto a map for more intuitive exploration.

Computational modeling to support public health decisions has proven valuable in recent emergencies, explained Nicole Lurie, M.D., M.S.P.H., assistant secretary for preparedness and response, U.S. Department of Health and Human Services, and co-author of a commentary in the journal's special issue.

"Recent public health crises, ranging from the 2009 H1N1 influenza pandemic to the Deepwater Horizon oil spill and Fukushima Daiichi nuclear accident, required leaders at all levels of government and the private sector to make decisions during times when knowledge was highly uncertain and limited," she said. "But each time, the scientific modeling community quickly engaged with public health response efforts to help consider how these events might unfold using computational models to generate alternative scenarios and to predict outcomes."

Universal flu vaccine within sight

Source: http://www.homelandsecuritynewswire.com/dr20130923-universal-flu-vaccine-within-sight

Researchers at Imperial College London asked volunteers to donate blood samples just as the swine flu pandemic was getting underway and report any symptoms they experienced over the next two flu seasons.

They found that those who avoided severe illness had more CD8 T cells (photo), a type of virus-killing immune cell, in their blood at the start of the pandemic.

They believe a vaccine that stimulates the body to produce more of these cells could be effective at preventing flu viruses, including new strains that cross into humans from birds and pigs, from causing serious disease.

The findings are published in *Nature Medicine*.

Professor Ajit Lalvani from the National Heart and Lung Institute at Imperial College London, who led the study, said: "New strains of flu are continuously emerging, some of which are deadly, and so the Holy Grail is to create a universal vaccine that would be effective against all strains of flu."

An Imperial College London release reports that today's flu vaccines make the immune system produce antibodies that recognize structures on the surface of the virus to prevent infection with the most prevalent circulating strains. They are, however, usually one step behind as they have to be changed each year as new viruses with different surface structures evolve.

Previously, experimental models had suggested that T cells may protect against flu symptoms but until now this idea has not been tested in humans during a pandemic.

Professor Lalvani's team rapidly recruited 342 staff and students at Imperial to take part in their study in autumn 2009. The volunteers donated blood samples and were given nasal swabs.

They were sent emails every three weeks asking them to fill in a survey about their health. If they experienced flu symptoms, they took a nasal swab and sent it back to the lab.

They found that those who fell more severely ill with flu had fewer CD8 T

cells in their blood, and those who caught flu but had no symptoms or only mild symptoms had more of these cells.
Professor Lalvani said, "The immune system produces these CD8 T cells in response to usual seasonal flu. Unlike antibodies, they target the core of the virus, which doesn't change, even in new pandemic strains. The 2009 pandemic provided a unique natural experiment to test whether T cells could recognise, and protect us against, new strains that we have not encountered before and to which we lack antibodies.
"Our findings suggest that by making the body produce more of this specific type of CD8 T cell, you can protect people against symptomatic illness. This provides the blueprint for developing a universal flu vaccine.
"We already know how to stimulate the immune system to make CD8 T cells by vaccination. Now that we know these T cells may protect, we can design a vaccine to prevent people getting symptoms and transmitting infection to others. This could curb seasonal flu annually and protect people against future pandemics."
Professor Lalvani is a Wellcome Trust Senior Research Fellow in Clinical Science and a National Institute for Health Research Senior Investigator. Other members of the team received support from Imperial College Healthcare NHS Trust, the Medical Research Council and Public Health England.

— Read more in S. Sridhar et al., "Cellular immune correlates of protection against symptomatic pandemic influenza," Nature Medicine *(22 September 2013)*

S.Korea, U.S. to Set Up Bioterror Monitoring System

Source: http://english.chosun.com/site/data/html_dir/2013/10/21/2013102101903.html

South Korea and the U.S. have agreed to set up a monitoring system against bioterror threats from North Korea.
The Defense Ministry on Sunday said the contract to build a surveillance portal system against biological weapons was signed Friday at the U.S. Army Medical Research and Materiel Command.
This system will detect and respond to the use of around 10 dangerous biological weapons such as anthrax and smallpox.
It will enable the South Korean military to receive information on vaccines and diseases from the U.S. Army Medical Research Institute of Infectious Diseases, while the U.S. will benefit from real-time information gathered by South Korea.
A Defense Ministry official said the two countries agree "that we need to be prepared for the potential use of biological weapons by North Korea, especially after what happened in Syria."

"Black Wind To America": A Deadly Terrorist Bioweapon Program Agenda?

By Larry Bell Forbes

Source: http://www.chicagotribune.com/news/politics/chi-nsc-black-wind-to-america-a-deadly-terrorist-20131020,0,2188800.story

I recently participated in a conference sponsored by Doctors for Disaster Preparedness, a group of medical physicians that promotes strategic and civil defense preparedness for emergencies of all kinds including war and terrorism. One of the speakers, Dr. Lee Hieb, M.D., presented talk on the subject of bioterrorism which I found to be interesting and unsettling. Having previously written about this potential threat, this interview with Dr. Hieb offers additional information and commentary for consideration.

Dr. Hieb, I enjoyed your discussion of bioterrorist threat at the DDP meeting. You are an Orthopedic Spine Surgeon, and a former Navy physician. How did you get interested in bioterrorism?

Well, in the nine years I was in the Navy I spent a lot of time with senior Marine and Navy officers, and also sat for a few years on the Navy Research Advisory Committee which looks at technology for the naval services. During that time I learned quite a lot about military

thinking, especially with regard to necessary medical support preparedness for combat operations.
But my impetus for studying bioterrorism was the furor over the anthrax that was spread just after the

planes crashed into the tower on 9/11.

Is there evidence that terrorist organizations are seriously preparing to conduct such attacks?
Larry, while we can't be certain, the advisor to the European Union on bioweapons has told them of the evidence of smallpox being tested on prisoners in Syria-and that was years before the current uprising. The word "smallpox" was also found written on incubation containers in Iraq after the first Gulf War.
More recently there has been chatter of a "black wind to America". After the attack in Spain, the Brigade of Abu Hafs al-Masri said, claiming to speak for al-Quaeda, "We announce the good news for the Moslems in the world that the strike of the black wind of death against America, is now at its final stage, 90 percent ready and it is coming soon, by God's will."
Some have interpreted this as a reference to a bio-attack. Again, we can't be sure that's what they are referring to, but it would be a mistake not to plan for every contingency.

So I take it you don't think that anthrax is the biggest worry...that maybe smallpox would be an even greater threat?
Well I am not going to minimize what happened with the anthrax. Clearly if you were a victim of that attack, anthrax was devastating. And it certainly was costly. The FBI estimates that, including the cleanup, the cost of that bioweapon attack was about 1 billion dollars.
And keep in mind that event involved a very small amount of anthrax the amount that could be generated from a few spores in a very short time. However, it was highly weaponized in a very sophisticated way, so not every corner store terrorist could pull that off.

So what are the really worst of the bad bio-agents out there?
To understand the possible threats clearly, I made myself a little table asking three questions of the major pathogens: Is it easy to spread? Is it deadly? And, do we have an effective treatment? For example, Ebola, an African hemorrhagic fever, is over 90 percent fatal if contracted and there is no treatment. But it is difficult to transmit.
Influenza is easy to transmit, and there really is no treatment, but it is not usually terribly fatal.
When you apply those three questions to bioterrorist germs, you find that only one is bad on all fronts. Smallpox is over 65 percent fatal in the strain preserved for bioweapons. It is one of the most communicable diseases...literally spreading like smoke, and there is no effective readily- available treatment.

I thought smallpox was wiped out. Where would terrorists get it?

In 1972 Nixon signed the bioweapons treaty halting all offensive bioweapons programs. There were 136 signatories including the Soviet Union. But the ink wasn't even dry when the Soviets began the largest bioweapons program to date, and they literally produced tons of a very deadly strain of smallpox. So although smallpox has been eradicated in the wild, it is alive and well in bioweapons and other research labs worldwide.

And sadly, when the Soviet Union collapsed, the scientists from Biopreparat/Vector went to work elsewhere. We don't know exactly where, and we don't know what pathogens they took with them. It isn't access to germs that is the biggest problem in bio-warfare, it is knowledge. And these guys were the brain trust.

So can't we protect people by vaccinating again?

We possibly could, assuming that the virus is not genetically modified. But we haven't been vaccinating people for decades, except our military personnel. If you, as a private citizen, are knowledgeable enough to be worried and want to protect your family, you cannot buy the vaccine in America at any cost.

Now, I thought that the whole world had stopped vaccinating against smallpox, but the other day I saw a teenager from Argentina with a vaccination scar. My boys were not vaccinated, but here is a 15 year old with a vaccine scar. Interesting and frightening. What if a terrorist unleashed smallpox after vaccinating the home team - so to speak?

Can't we stop an outbreak like we did when we originally fought to wipe the disease out?

Unfortunately much has changed since then. In one of the last outbreaks of smallpox in Yugoslavia in the 70's, it took 18,000,000 doses of vaccine to stop the spread. That outbreak happened when people were less mobile, when most people were vaccinated, when we were used to quarantining people in their homes, and when we had rapid response medical teams ready to go at a moment's notice wherever an outbreak occurred.

We also had depots of vaccine strategically located around the world. None of this pertains today. Keep in mind, before an organized eradication program, smallpox killed more people in the twentieth century than all the wars put together.

Is the medical profession aware of this danger?

Well yes and no. In 2003, a Journal of American Medicine Association consensus report said, "The discovery of a single suspected case of smallpox must be treated as an international health emergency." And, "Its (smallpox) potential for devastation today is far greater than at any previous time." But this appreciation of the threat gets lost in the government bureaucracy.

When I was in Arizona, then-Governor Janet Napolitano did not want to allow even first responders to be vaccinated for fear of workman's compensation issues if there were reactions to the vaccine. When I called the head of the Arizona public health years ago asking for some vaccine he assured me that in the event of an outbreak they would release vaccine from the depot (wherever that was) and distribute it.

Really? Remember the flu scare a few years ago and how little the vaccine was available, and how long the lines were. And no one was dropping like flies from a deadly disease. In a smallpox outbreak they estimate that it will be worldwide in two weeks - worldwide and killing over half of the people in its wake. Where will the truckers be who will transport the vaccine? Who will man our ER's? Who will risk standing in line in a public place to get vaccinated?

I think it highly ironic that the government forces people to take influenza vaccine when its benefits are marginal at best. Yet, they forbid us from even vaccinating the people essential to stemming a bioterrorist outbreak - even on a voluntary basis!

So what can the individual citizen do?

Well, I, personally, have an isolation plan. I have a son in college and one in medical school. I have told them that in such an event they should come home to the farm by the most direct car route without stopping en route, and we will hunker down 'till vaccine is available. Although the so called "preppers" are made fun of, even the Department of Homeland Security

recommends storing some food and water, and in this kind of emergency such preparation may be lifesaving.
I also write a column for World Net Daily, and have asked readers to let me know if they were aware of vaccine being available outside the U.S. One reader wrote in the comments that it was available in Paris, France. I haven't confirmed this yet, but am planning to take a trip and obtain some if possible.

And what would you say to Congress about this issue?
First and foremost, they need public education in general about bioterrorism and what people should do in the event of an attack. We used to have drills for nuclear warfare. Now it is fashionable for everyone to make fun of those drills. But truly such attacks are not 100 percent fatal if you know how to respond and are not at the center of the blast. Similarly, with a biologic attack, there are good and bad responses. Mobility is bad. Going to hospitals is bad. If you know what to look for you will be less likely to panic.
Secondly we need to allow voluntary vaccinations of critical personnel. And in my opinion, both on practical and ethical terms, anyone who wants it should be able to obtain a vaccination for themselves and their children. Governments have a less than stellar record of being capable of protecting citizens from disasters, and we should not be wholly dependent on the government to protect us in this case.
Finally, we need intelligence gathering, realistic threat assessment, continued research, and a quarantine plan.

Lee, I didn't sleep particularly well after your speech, and this is not likely to make readers comfortable either. In any case, thank you for sharing your information, concerns and advice.
Larry, we can't afford to continue to be complacent about this. We may not want to think the unthinkable, but rest assured... our enemies are. And we can do much more to be prepared. Thanks for asking me for an interview.

Innovative salmonella sensing system

Source: http://www.homelandsecuritynewswire.com/dr20131021-innovative-salmonella-sensing-system

Foodborne illnesses making one in six Americans — or forty-eight million people — sick each year. Of these people sickened, 128,000 end up in the hospital, according to the Centers for Disease Control and Prevention, while 3,000 die. A new approach to detecting food contamination enables real-time testing of food and processing plant equipment.
As anyone who has ever consumed bacteria-contaminated food and experienced food poisoning can tell you, it is a miserable experience. Yet it is an all-too-common one, with foodborne illnesses making one in six Americans — or forty-eight million people — sick each year. Of these people sickened, 128,000 end up in the hospital, according to the Centers for Disease Control and Prevention, while 3,000 die.
Foodborne illnesses spread easily and, as such, are a difficult-to-control problem — even more so in developing nations. This means that quick detection can play a critical role in halting the spread of contamination. Traditional detection methods, however, tend to be haltingly slow.

An IOP release reports that a team of Auburn University researchers, recognizing the need for a real-time biosensing system to detect pathogenic bacteria such as Salmonella, came up with a novel design, which they describe in the American Institute of Physics' *Journal of Applied Physics*.
What sets this biosensing system apart from traditional detection methods is a design that involves using a magnetoelastic biosensor — a low-cost, wireless acoustic wave sensor platform — combined with a surface-scanning coil detector. The biosensors are coated with a bacteria-specific recognition layer containing particles of "phage," a virus that naturally recognizes bacteria, so that it is capable of detecting specific types of pathogenic bacteria.
Traditional technologies required the sensor to be inside a coil to measure the sensor's signals, said Yating Chai, a doctoral student in Auburn University's materials engineering program.
"The key to our discovery is that measurement of biosensors can now be made 'outside the coil' by using a

specially designed microfabricated reading device," he explained.
"In the past, if we were trying to detect whether or not a watermelon was contaminated with Salmonella on the outside of its surface, the sensors would be placed on the watermelon, and then passed through a large coil surrounding it to read the sensors," Chai says.

By stark contrast, the new biosensing system is a handheld device that can be passed over food to determine if its surface is contaminated.
"Now, tests can be carried out in agricultural fields or processing plants in real time — enabling both the food and processing plant equipment and all surfaces to be tested for contamination," notes Chai.

— Read more in Yating Chai et al., "Design of a surface-scanning coil detector for direct bacteria detection on food surfaces using a magnetoelastic biosensor," Journal of Applied Physics *114, no. 10 (2013): 104504*

Design of a surface-scanning coil detector for direct bacteria detection on food surfaces using a magnetoelastic biosensor

Abstract
The real-time, in-situ bacteria detection on food surfaces was achieved by using a magnetoelastic biosensor combined with a surface-scanning coil detector. This paper focuses on the coil design for signal optimization. The coil was used to excite the sensor's vibration and detect its resonant frequency signal. The vibrating sensor creates a magnetic flux change around the coil, which then produces a mutual inductance. In order to enhance the signal amplitude, a theory of the sensor's mutual inductance with the measurement coil is proposed. Both theoretical calculations and experimental data showed that the working length of the coil has a significant effect on the signal amplitude. For a 1 mm-long sensor, a coil with a working length of 1.3 mm showed the best signal amplitude. The real-time detection of Salmonella bacteria on a fresh food surface was demonstrated using this new technology.

Tuberculosis Outbreaks Spark New Worries

Source: http://www.emergencymgmt.com/health/Tuberculosis-Outbreaks-Spark-New-Worries.html

It is arguably the most devastating disease in human history. It was found in the mummies of ancient Egypt; it was common in the time of Plato and Caesar; and it has taken the lives of the poor, the rich, the unknown and the famous for centuries. When the poet John Keats contracted tuberculosis in 1820, he knew there was no cure and called it his "death warrant," dying at the age of 25.
Since then, antibiotics have largely tamed tuberculosis (TB) in the developed world. Over the past hundred years, consumption, as it was once known, has steadily declined. TB is now at an all-time low in the U.S., with fewer than 10,000 new cases reported in 2012. But in recent months, outbreaks have been reported among the poor, homeless and immigrant populations of several communities, including Jacksonville, Fla.; Sheboygan, Wis.; and Los Angeles County. A confluence of factors has public health officials worried that these outbreaks may become more widespread and harder to contain.

Could TB be coming back?
Federal support for health security research is heavily weighted toward preparing for bioterrorism and other unnatural biological threats, leaving significantly less funding for epidemics. "After 2001, a bunch of money went to bioterrorism," wrote Shoshana R. Shelton, senior project associate with the Rand Corp. "I believe the money that goes toward bioterrorism should be used for more all-hazards performance." While bioterrorism is an undeniable threat, she wrote, "naturally occurring disease outbreaks happen every day."
What's more, budget cuts and staff reductions continue to plague state and local health departments, making it harder for them to provide basic services and prepare for and respond to these everyday emergencies. Controlling a disease like TB depends significantly on rapid identification and reporting of active cases, but, Shelton wrote, "decreased staffing means decreased capacity to conduct

disease investigations and fewer astute clinicians trained in TB."

Dr. Jonathan Fielding, director of the Los Angeles County Department of Public Health, admits that a 37 percent reduction in funding since 1996 and about a 55 percent cut in staffing have been "problematic." The county has answered the recent outbreak there with new TB guidelines for homeless shelters, including designating TB liaisons, creating "cough alert" logs for tracking patients with persistent coughs, and recommending that shelters screen incoming clients and refer them to health providers.

Will that be enough? "We are very concerned about drug-resistant TB," Fielding says. "It is really important to treat people fully or there will be strains that are much more difficult to treat. We are still doing a good job as indicated by the overall declining number of cases, but I must admit I am concerned that we still have a number of suspects that have not declined. I hope state and federal government will realize that and contribute [more money]."

Ohio recognized the lurking TB problem back in 2009 and added a TB module to its disease reporting system. "We expanded beyond just the required data elements to include note and case management sections," says Maureen Murphy-Weiss, TB controller with the Ohio Department of Health. "As TB has declined nationally, so has the lack of expertise. A large number of workers are retiring and that is where our knowledge base has been. TB requires a very specific skill set and knowledge base." By building in real-time surveillance and case management, Ohio's state health office will be able to monitor for TB and intervene early, mitigating the potential for further transmission of TB in the community.

Because overall TB control has been successful, "our guard is down," says Murphy-Weiss. "We have to become creative in maintaining the infrastructure because history has shown us that when we believe we have conquered this disease, it comes back—and it comes back with a vengeance."

Haitian Cholera Strain Spreads To Mexico

Source: http://wemu.org/post/haitian-cholera-strain-spreads-mainland-mexico-outbreak

A South Asian strain of cholera that was introduced into Haiti three years ago this month has now spread to this continent's mainland.

Mexico is the fourth Western Hemisphere country to experience the cholera outbreak. It's a disease that's very hard to stamp out once it gets into an area with poor water and sanitation.

Mexican health officials first picked up on the problem Sept. 9, through routine surveillance of hospital cases of severe diarrhea. Since then there have been 171 reported cases in Mexico City and states to the north and east. One victim has died.

Dr. Jon Andrus, deputy director of the Pan American Health Organization, says it was all but inevitable that cholera would spread beyond the Caribbean. "It was always a major concern that it would be exported to other countries, as has recently happened in Mexico," he tells Shots.

Since it was introduced into Haiti — very likely by United Nations peacekeeping troops from Nepal who were billeted at a camp with poor

sanitary facilities — cholera has sickened 715,000 people in Haiti and the Dominican Republic (which share the island of Hispaniola) and Cuba. Nearly 9,000 have died.

Andrus fully expects it will spread further. "We are advocating throughout the region for countries to be on their guard," he says.

A nurse treats a cholera patient at the Juan Pablo Pina Hospital in San Cristobal, Dominican Republic, in August. Health officials say that the strain of cholera circulating in the country— the same one that first appeared in Haiti three years ago — has also caused outbreaks in Cuba and now Mexico.
Erika Santelices / AFP/Getty Images

Cholera is thought to have invaded Cuba via infected health personnel who work in Haiti and travel back and forth. Cuba has reported nearly 700 cholera cases and three deaths, although many are skeptical that that nation is fully reporting the extent of its outbreak.

Andrus says vacationers visiting Cuba — who probably got cholera from contaminated food — have exported the disease to Chile, Venezuela, Italy, Germany and Holland. So far those cases haven't touched off outbreaks. But as the Mexican epidemic shows, it can easily happen if an imported case contaminates water or food in an area with poor sanitation.

"You have those situations throughout Latin America," he notes. "We are the region of the greatest disparities."

The last time the Americas saw a major cholera epidemic was 22 years ago. It was allegedly brought by a ship that discharged its bilge water in a Peruvian port. The disease spread all the way up the continent, sickening more than 1 million people and killing 10,000 or so, until it hit the U.S.-Mexican border. There it was stopped by modern water- and sewage-treatment facilities in the United States.

Andrus says PAHO is worried this latest epidemic will have a similar impact.

"It's really, for us, a defining moment," he says. "To what extent are we concerned about spread? Well, it's really a regional threat and now a global threat to health."

It took Mexico more than 10 years to bring its last cholera epidemic under control. This time sanitary conditions are better, so it might not take that long. But Andrus says it won't be easy to stamp out.

"It won't be 10 years, [but] it won't be days or weeks," he says.

Dr. Maureen Birmingham, PAHO's representative in Mexico, writes in an email to NPR that authorities there are monitoring the population for spread of cholera and focusing on prompt treatment of affected people, along with providing clean water and sanitary facilities to vulnerable communities.

Birmingham says Mexico is not currently considering use of an oral cholera vaccine that was approved last year by the World Health Organization for use in outbreaks. The WHO has reportedly stockpiled about 1 million doses of the vaccine, which costs $1.85 a dose and requires two doses.

In any case, the cholera vaccine is a stopgap measure. All public health authorities agree the only real solution is clean water and adequate sewage treatment. And many of them hope the current outbreak will stimulate major efforts to bring clean water and sanitation to the hemisphere's poorest communities.

"Cholera's one of those infections that catches attention in a way that few infections do — plague, Ebola, pandemic influenza, cholera," says Dr. Edward Ryan of the Massachusetts General Hospital. "It's one of those ones that everybody sort of sits up straight for. It is one of the ones that tests the system."

But Brian Concannon of the Institute for Justice and Democracy in Haiti points out that the United Nations has found only 10 percent of the $2.4 billion it says it needs to rid Haiti and the Dominican Republic of cholera over the next 10 years.

"Right now 10 percent of the funding is probably not enough even to get started," Concannon tells Shots. "And so the U.N. needs to feel some serious pressure to do a more serious job of raising the money."

Concannon's group is trying to do just that. Earlier this month it filed suit against the U.N. in U.S. District Court for its alleged role in introducing cholera to Haiti. Filed on behalf of cholera victims, the action seeks, among other things, to force the U.N. to raise the money to stamp out cholera on Hispaniola.

Discovery of new botulism toxin prompts bioterrorism fears

Source: http://www.lexology.com/library/detail.aspx?g=f13fa91d-4acc-4b9b-9a31-24988730bac9

Two new studies recently published in the *Journal of Infectious Diseases* have reportedly identified for the first time in more than 40 years a new strain of *Clostridium botulinum*, prompting debate over whether the genetic sequences needed to reproduce the toxin should be made available to the public despite concerns that the information could pose a security risk. Jason Barash and Stephen Arnon, "A Novel Strain of *Clostridium botulinum* That Produces Type B and Type H Botulinum Toxins," *Journal of Infection Diseases*, October 2013. Nir Dover, et al., "Molecular Characterization of a Novel Botulinum Neurotoxin Type H Gene," *Journal of Infection Diseases*, October 2013.

According to an October 10, 2013, article in *CIDRAP News*, the California Department of Public Health researchers who discovered botulinum neurotoxin type H (BoNT/H) using an infant botulism case have declined to release their data until an antitoxin has been developed. They apparently arrived at their decision after consulting with several government agencies as well as the journal's editors, who in turn exempted the researchers from the usual requirement that they submit gene nucleotide sequences to the International Nucleotide Sequence Databases before publication.

At the same time, however, David Relman, chief of infectious diseases with the VA Palo Alto Health Care System and principle investigator with the Stanford University School of Medicine, notes in a concurrent editorial that the BoNT/H case recalls the controversy surrounding *Nature's* decision to publish research detailing the creation of a human-contagious form of avian flu. In particular, he suggests that the scientific community needs to invest in a mechanism to mitigate the risk of such studies while allowing important research to continue. David Relman, "'Inconvenient truths' in the pursuit of scientific knowledge and public health," *Journal of Infectious Diseases*, October 2013.

"I hope that this discovery forces policy-makers, scientists, and other members of the general society to confront the reality of increasingly frequent and consequential risks that arise from work in the life sciences, and develop more robust strategies for risk mitigation," Relman told *CIDRAP News*. "I am quite worried that the challenges and complexities of developing such strategies has caused many scientists, science policy-makers and others in government to turn away, and either proclaim that the risks are not real, or that we have no such mechanisms for limited communication and therefore that we should stop working on this."