With respect to viral therapeutics, one of the major limitations associated with antiviral drugs is acquired drug resistance caused by antigenic shift or drift. A number of next-generation prophylactic and/or therapeutic measures are on the horizon. Of these, nucleic acid-based drugs are showing great antiviral potential.

These drugs elicit long-lasting, broad spectrum protective immune responses, especially to respiratory viral pathogens. The Nucleic Acid-Based Antiviral (NaVirCept) project provides the opportunity to demonstrate the effectiveness of novel medical countermeasures against military-significant endemic and other viral threat agents.

This project expands existing DRDC drug delivery capability development, in the form of proprietary liposome intellectual property, by coupling it with leading-edge nucleic acid-based technology to deliver effective medical countermeasures that will protect deployed personnel and the warfighter against a spectrum of viral disease agents.

The technology pathway will offer a means to combat emerging viral diseases or modified threat agents such as the bird flu or reconstructed Spanish flu without going down the laborious, time-consuming and expensive paths to develop countermeasures for each new and/or emerging viral disease organism.

56. DUAL-USE THREAT ASSESSMENT FRAMEWORK - AN ATTEMPT TO QUANTIFY THE RISK *(8)*

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Advances in the biosciences over the past decade have been rapid and transformative. While these advances offer significant benefit to society, they also provide very significant challenges in terms of security. Concerns over misuse and/or accidental use/release (dual use) although not new, are now being viewed through the security lens.

There is a wide-spread view that public or private sector scientists, supported through investments by pharmaceutical, environmental and agricultural interests working in the fields that comprise biotechnology, posses the ability to assess the implications of their own work and work within a regime of self-control that is for the most part self-governing (codes of practice). On the other end of the spectrum are those that would codify or legislative control. All this is being done in the absence of a mechanism for quantifying the threat.

This presentation will discuss the development of an assessment framework that addresses both actual and potential threats. The framework was developed based on available intelligence and other open source information along with interviews with those persons familiar with the concept of dual use and the multiple, sometimes competing agendas of a variety of interest groups. The framework will help to bring some clarity to the discussion and at the same time, help to inform those that are positioned to respond to the threat.

57. INTELLIGENCE AND SECURITY STANDARDS ON INDUSTRIAL FACILITIES PROTECTION IN CASE OF TERRORISM AND MILITARY ATTACK *(6)*

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Industrial facilities, which use toxic chemicals in their production processes, are tempting targets for military and terrorist strategists. They know that these facilities when attacked could produce effects not realizable with conventional weapons. The resulting legal, policy and political consequences would be minimal as compared to that of disseminating toxic chemicals or chemical agents as weapons on enemy territory. At this time there is no clear definition of the legality or illegality of these types of actions used against specific industrial targets for the purpose of mass destruction or disruption.

Without clearly defined international regulations covering these actions, we must depend solely on national defense systems. Not only are these regulation not defined, there are no implementation tools, which would be available if the various treaties (CWC/BWC) etc., were able to incorporate needed legislative action. Consequently we must depend on and put into practice defense security standards for industrial facilities for protection against both possible terrorist and military attacks.

Emergency responses to incidents involving violent criminals and terrorists are extremely dangerous. Incidents involving weapons of mass destruction, firearms, and hazardous materials have resulted in the injury and death of many firefighters, police officers and medical personnel. We wish to intend display place and role of intelligence and counter intelligence system to prevention potential target and military attack.

Security needs to be incorporated into the public safety culture and it must become the routine for how we operate. The recognition and identification process is an important skill that needs continual refinement. The use of transportation or facility paperwork assists in recognizing what potential hazards. A key factor in the successful command and management of a hazmat incident or terrorism event is the ability of public safety agencies to function as a team.

A terrorism event or hazmat crime brings multiple agencies together, but their integration needs to be seamless. Response to these incidents presents acute and long term health risks to public safety personnel. There are many factors involved in the selection and use of protective equipment. New threats and technology are emerging. Then we will describe the specific situation by participating in joint-agency

working groups and by maintaining regular liaison and routine coordination with local and state law enforcement and intelligence agencies.

Applicable regulations and national consensus standards governing emergency response and post-emergency response operations conducted at criminal or terrorist incidents involving hazardous materials or attack on oil, chemical and petrochemical industry.

Key words: Industry safety, chemical warfare, safety procedure, first response

58. ADENOVIRUS-VECTORED VACCINE AS A RAPID-RESPONSE TOOL AGAINST AVIAN INFLUENZA PANDEMIC *(2)*

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Influenza viruses in nature undergo genetic mutation and reassortment. Three pandemics of avian influenza in man were recorded in the twentieth century. Highly pathogenic avian influenza (HPAI) viruses currently in circulation pose a threat for another world-wide pandemic, if they become transmissible from man to man. Manufacturing protective vaccines using current egg-based technology is often difficult due to the virulence of the virus and its adverse effects on the embryonating egg substrate. New technologies allow the creation of safe and protective pandemic influenza vaccines without the need for egg based substrates.

These technologies allow new vaccines to be created in less than one month. Manufacturing is in tissue culture, not eggs. Vaccine can be administered to man non-invasively, without adjuvants, eliciting a rapid and protective immune response.

Protective immunity against avian influenza (AI) virus was elicited in chickens by single-dose *in ovo* vaccination with a replication-competent adenovirus (RCA)-free human adenovirus serotype 5 (Ad5)-derived vector encoding an H5N9 avian influenza virus hemagglutinin. Vaccinated chickens were protected against both H5N1 and H5N2 HPAI virus challenges. Mass-administration of this bird flu vaccine can be streamlined with available robotic *in ovo* injectors. Vaccination using this vaccine could protect the the largest host reservoir (chickens) and greatly reduce the exposure of man to avian influenza. In addition, Ad5-vectored vaccines can be produced rapidly and the safety margin of a non-replicating vector is superior to that of a replicating counterpart. Furthermore, this mode of vaccination is compatible with epidemiological surveys of natural AI virus infections.

In addition to mass immunization of poultry, both animals and humans have been effectively immunized by intranasal administration of Ad5-vectored influenza vaccines without any appreciable side effects, even in mice and human volunteers with preexisting immunity to Ad5. RCA-free Ad5-vectored AI vaccines may thus provide a critical tool for mitigating an AI pandemic in a simple, rapid, and safe manner.

Key words: avian influenza, in-ovo vaccine, nasal vaccine, adenovirus-vectored vaccine, replication-competent adenovirus

59. NON-REPLICATING ADENOVIRUS-VECTORED ANTHRAX VACCINE *(6)*

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As bioterrorism is emerging as a national threat, it is urgent to develop a new generation of anthrax vaccines that can be rapidly produced and mass administered in an emergency setting. We have demonstrated that protective immunity against anthrax spores could be elicited in mice by intranasal administration of a non-replicating human adenovirus serotype 5 (Ad5)-derived vector encoding Bacillus anthracis protective antigen (PA) in a single-dose regimen. The potency of an Ad5 vector encoding PA was remarkably enhanced by codon optimization of the PA gene to match the tRNA pool found in human cells. This nasal vaccine can be mass-administered by non-medical personnel during a bioterrorist attack.

In addition, replication-competent adenovirus (RCA)-free Ad5-vectored anthrax vaccines can be mass produced in PER.C6 cells in serum-free wave bioreactors and purified by column chromatography to meet a surge in demand. The non-replicating nature of this new generation of anthrax vaccine ensures an excellent safety profile for vaccinees and the environment.

60. ANTIDOTAL EFFICACY OF A NEW COMBINATION IN TREATMENT OF SUBACUTE T-2 TOXIN POISONING IN RATS *(12)*

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Trichothecene mycotoxin, T-2 toxin is a natural metabolite of *Fusarium fungi*. T-2 toxin possesses several properties (significant persistence in the environment, cheap manufacture, difficult detection and absence of a specific antidote) that make it a very dangerous potential chemical warfare agent. In our previous experiments, nonsteroidal anti-inflamatory drug (NSAID) nimesulide (NIM), as a selective COX-2 inhibitor, and zeolite absorbent (Min-a-zel Plus®, MIN+) administered separately showed a good protective effects against general toxicity induced by T-2 toxin (T2).

The aim of this study was to evaluate the antidotal potential of the combination of these two