WG 1 (Chemical, Biological, Radiological and Nuclear materials)

Detect. Assess. Inform. Act: The Health Intelligence Agency

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Effective disease surveillance is critical for early detection, risk assessment, and response to public health threats. This lecture explores key methodologies for tracking and analyzing outbreaks, highlighting the vital role of health intelligence in preparedness and decision-making.
Real-time data plays a crucial role in identifying emerging health risks. For example, West Nile fever outbreaks have been detected through mosquito surveillance, allowing authorities to implement vector control measures and reduce transmission. Similarly, health intelligence has been instrumental in tracing Hepatitis A outbreaks, enabling public health interventions such as vaccinations.
By leveraging epidemiological modeling, data analytics, and cross-sector collaboration, health intelligence assesses risks and provides actionable insights to policymakers and healthcare professionals.
Through case studies and real-world examples, this session will demonstrate how a proactive and intelligence-driven approach strengthens public health resilience, ultimately leading to more effective outbreak prevention and response.

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West Nile virus – Model of Infection and Treatment Evaluation

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The West Nile virus (WNV), which is the etiological agent for West Nile fever, is a member of the Flaviviridae family. It is predominantly transmitted to humans through the bite of infected mosquitoes, with birds acting as the primary natural reservoir for the virus. First identified in Uganda, WNV has spread worldwide. In the United States, WNV is considered as a significant public health concern. It is the leading cause of mosquito-borne disease, with thousands of reported cases annually, especially in the summer and fall.
Approximately 20% of those infected develop symptoms, typically mild flu-like fever lasting a week, without the need for treatment. In approximately 1 in 150 cases, particularly among individuals aged 60 and above, those with weakened immune systems, the disease may be prolonged and severe. Complications can include central nervous system involvement, such as meningitis and encephalitis, with a fatality rate of 10% among severe cases.
In this study, we administered WNV-NY99 to mice via intra-footpad injection to model the natural route of infection and disease progression. Based on this disease model, we tested potential treatment. A single-dose of poly(I:C), showed significant efficacy. Early treatment with poly(I:C) resulted in survival rates of 60-100% in the animals. In poly(I:C)-treated mice, the virus was undetectable in the blood, spleen, and draining lymph nodes. Although the brain remained a target organ for the virus, the viral load in the brain was lower in treated mice at day 6 post-infection, and by day 8, the virus was cleared from the brain. Histological analysis further supported these findings, showing a significant reduction in viral load and tissue damage following treatment.
Additionally, the established model was used to evaluate the pathogenicity of the WNV strain caused an unprecedented surge of WNV disease in Israel during 2024.