IOCV 2025 Conference

The 3rd International Online Conference on Vaccines

26–28 November 2025 | Online

Program and Abstract Book

Organizers

MDPI

vaccines

Sponsors

viruses

Journal of Clinical Medicine

学术会议云 ALLCONFS.ORG

sciforum.net/event/iocv2025
#IOCV2025

The 3rd International Online Conference on Vaccines

26–28 November 2025 | Online

MDPI

Organizing Committee

Conference Chair

Professor Sara Louise Cosby

Session Chairs

Professor Peter Delputte
Professor Stephanie Longet
Professor Ultan Power
Prof. Dr. Jorge H. Leitão
Prof. Dr. Mona O. Mohsen
Prof. Dr. Seth Pincus
Prof. Dr. Silvio Tafuri
Prof. Dr. Srinivasa Reddy Bonam

Scientific Committee

Dr. Ahmad Rushdi Shakri
Dr. Giovanna Deiana
Dr. Mohammed Rohaim
Dr. Paul Takam Kamga
Dr. Pedro Cecílio
Dr. Qibin Geng
Dr. Ramireddy Bommireddy
Dr. Theocharis Konstantinidis
Professor Alexander Zakhartchouk
Professor Anna Nilsson
Professor Dimitris Zavras
Professor Keren Dopelt
Professor Ping Wang
Professor Tomáš Hanke
Professor Uladzimir Karniychuk
Professor Xingmin Sun
Professor Xinyuan Chen
Prof. Dr. Luca Coppeta

Organised by

MDPI

Conference Secretariat

Email: iocv2025@mdpi.com

Table of Contents

Welcome from the Chair

We are pleased to announce **the 3rd International Online Conference on Vaccines (IOCV 2025)**, which will be held online and promoted by the open access MDPI journal *Vaccines* (ISSN 2076-393X, IF 3.4).

The vaccine research field is constantly moving forward to address crucial challenges in developing novel vaccines, enhancing existing platforms and model systems for infectious diseases and cancer. This edition of IOCV will highlight groundbreaking research on innovative vaccine delivery methods, mucosal vaccines for respiratory disease, vectored vaccines, models for vaccine development and evaluation, new approaches for vaccine adjuvants and emerging approaches in cancer immunotherapy. A deeper understanding of immune responses to both infectious disease and cancer vaccines as well as novel strategies for enhancement, delivery and evaluation are essential for advancement of human and veterinary vaccinology.

The IOCV 2025 invites researchers from academia, as well as vaccine practitioners, to contribute original findings, novel ideas, scientific concepts, and technological advancements related to the following:

S1. Mucosal Vaccines for Respiratory Disease;
S2. Vectored Vaccines;
S3. Models for Vaccine Development and Evaluation;
S4. New Approaches for Vaccine Adjuvants;
S5. New Methods for Vaccine Delivery;
S6. Cancer Vaccines and Immunotherapy.

As a fully online conference, IOCV 2025 provides a unique opportunity for researchers worldwide to participate without travel constraints, facilitating the real-time exchange of the latest findings and innovative ideas.

Your contributions and engagement are vital to the success of this 3rd edition of the IOCV. We look forward to your participation in shaping the future of vaccine research!

Professor Sara Louise Cosby
Conference Chair
School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, UK Virology, Veterinary Sciences Division, Agri-Food and Biosciences Institute, UK

vaccines

an Open Access Journal by MDPI

Vaccines (ISSN 2076-393X) is an international, peer-reviewed open access journal focused on laboratory and clinical vaccine research, utilization and immunization. *Vaccines* publishes high quality reviews, regular research papers, communications and case reports. Our aim is to encourage scientists to publish their experimental and theoretical results in open access form in as much detail as possible. The full experimental details must be provided so that the results can be reproduced and computed data or files regarding the full details of the experimental procedure can be deposited as supplementary material.

Journal Webpage: https://www.mdpi.com/journal/vaccines

Session Chairs

Prof. Dr. Mona O. Mohsen

Department of Biomedical Research, University of Bern, Bern, Switzerland

Prof. Dr. Srinivasa Reddy Bonam

1. CSIR-Indian Institute of Chemical Technology, Hyderabad, Ministry of Science and Technology, Govt of India. 2. Academy of Scientific and Innovative Research (AcSIR), Chennai, India

Prof. Dr. Silvio Tafuri

Interdisciplinary Department of Medicine, Aldo Moro University of Bari, Bari, Italy

Prof. Dr. Seth Pincus

Department of Chemistry and Biochemistry, Montana State University, Bozeman, MT, USA

Prof. Dr. Jorge H. Leitão

Instituto Superior Técnico, Universidade de Lisboa, Lisboa, Portugal

Professor Peter Delputte

Department of Biomedical Sciences, University of Antwerp, Anvers, Belgium

Professor Stephanie Longet

International Center for Infectiology Research, Lyon, France

Professor Ultan Power

School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, Ireland

Keynote Speakers

Prof. Dr. med. Daniel Speiser

University and Hospital of Lausanne, Lausanne, Switzerland

Prof. Dr. Jose Lorenzo Valencia Martin

Department of Preventive Medicine & Public Health, Faculty of Medicine, University of Sevilla, Sevilla, Spain

Professor Isabelle Dimier-Poisson

Faculty of Pharmacy, University of Tours, Tours, France

Professor Jagadeesh Bayry

Department of Biological Sciences & Engineering, Indian Institute of Technology Palakkad, Palakkad, India

Professor Paulo Bettencourt

Faculty of Medicine, Universidade Católica Portuguesa, Lisbon, Portugal

Professor Claudia Maria Trombetta

Department of Molecular and Developmental Medicine, University of Siena, Siena, Italy

Invited Speakers

Dr. Simone de Brot
Institute of Animal Pathology, University of Bern, Bern, Switzerland

Dr. Surojit Sarkar
University of Washington School of Medicine, Seattle, WA, USA

Dr. Carol Leung
Centre for Immuno-Oncology, University of Oxford, Oxford, UK

Dr. Wendao Liu
The University of Texas MD Anderson Cancer Center, Houston, TX, USA

Dr. Julie Decock
College of Health and Life Sciences & Qatar Biomedical Research Institute, Hamad Bin Khalifa University, Doha, Qatar

Dr. Antonio Di Lorenzo
Interdisciplinary Department of Medicine, University of Study of Bari, Bari, Italy

Mr. Alexander Badten
Institute for Translational Sciences, The University of Texas Medical Branch, Galveston, TX, USA

Dr. Jean-Denis Shu
CanSino Biologics, Tianjin, China

Dr. Kishore Alugupalli
TurboVax, Philadelphia, PA, USA

Dr. Fang Xu

CanSino Biologics Inc., Tianjin, China

Dr. Julie Decock

Qatar Biomedical Research Institute (QBRI), Hamad Bin Khalifa University, Ar-Rayyan, Qatar

Program Overview

	26th November	27th November	28th November
Morning	**Session 1.** Mucosal Vaccines for Respiratory Disease **Session 2.** Vectored Vaccines	**Flash Poster Session**	**Session 5.** New Methods for Vaccine Delivery **Session 4.** New Approaches for Vaccine Adjuvant
Afternoon	**Session 6.** Cancer Vaccines and Immunotherapy	**Session 3.** Models for Vaccine Development and Evaluation	

IOCV 2025 Program

26th November 2025 (Wednesday)

Session 1. Mucosal Vaccines for Respiratory Disease
Session 2. Vectored Vaccines

Time: 9:00 (CET, Basel) / 03:00 (EDT, New York) / 16:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
09:00–09:15	*Welcome from the Event Chair* ***Professor Sara Louise Cosby***	
09:15–09:35	*Welcome from the Session Chairs* ***Professor Peter Delputte*** ***Professor Stephanie Longet***	
9:35–10:05	**Professor Isabelle Dimier-Poisson** Keynote Speaker	COVID Nasal Vaccine and Beyond: A New Vaccinology Platform
10:05–10:30	**Dr. Fang Xu** Invited Speaker	CanSinoBIO solution for TB control: Inhaled Adenovirus (Human type 5) Vectored Tuberculosis Vaccine
10:30–11:00	**Dr. Jingyou Yu** Keynote Speaker	Adenoviral-Vectored Vaccines: Challenges and Opportunities
11:00–11:15	**Xingmin Sun** Selected Speaker	The Receptor binding domain 2 (RBD2) of binary toxin (CDT) as a promising vaccine candidate protects both mice and hamsters against CDT challenge
11:15–15:00	**BREAK**	

Session 6. Cancer, Vaccines and Immunotherapy

Time: 15:00 (CET, Basel) / 09:00 (EDT, New York) / 22:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
15:00–15:15	*Welcome from the Session Chairs* ***Prof. Dr. Mona O. Mohsen*** ***Prof. Dr. Seth Pincus***	
15:15–15:35	**Prof. Dr. Daniel Speiser** Keynote Speaker	Target antigens for cancer vaccines
15:35–15:55	**Dr. Simone De Brot** Invited Speaker	Evaluating Vaccine-Induced Tissue Effects Through Multiplexing and Digital Pathology
15:55–16:15	**Dr. Surojit Sarkar** Invited Speaker	Regulation of T cell Exhaustion and Immunotherapy by Common gamma-chain cytokines and mimetics
16:15–16:35	**Dr. Carol Leung** Invited Speaker	Chemotherapy synergizes with cancer vaccines and expands stem-like TCF1+CD8+ T cells
16:35–16:55	**Dr. Wendao Liu** Invited Speaker	Single-cell immune profiling reveals potent anti-tumor immune response in virus-like particle vaccine and anti-CTLA4 treatment through lymphatic delivery
16:55–17:15	**Dr. Julie Decock** Invited Speaker	Cancer/Testis Antigens as Precision Tumor Targets for Cancer Vaccines and Adoptive Cell Therapy
17:15–17:30	**Arnau Solé Casaramona** Selected Speaker	Preclinical Potential of γδ T Cells in Novel Personalized Antigen-Directed Immunotherapy for Triple-Negative Breast Cancer
17:30–17:45	**Yusra Zarlashat** Selected Speaker	Next-Generation Cancer Vaccines and Immunotherapy: Neo-Antigen Strategies and AI-Driven Personalization for Precision Tumor Targeting
17:45–18:00	**Inesa Stonkutė** Selected Speaker	Therapeutic Cancer Vaccines Combined with Immune Checkpoint Inhibitors in Head and Neck Squamous Cell Carcinoma: A Systematic Review of Clinical Evidence

27th November 2025 (Thursday)

Flash Poster Session

Time: 9:00 (CET, Basel) / 03:00 (EDT, New York) / 16:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
09:00–09:05	*Welcome speech by MDPI host*	
09:05–09:10	**Mahsa Asgari** Selected Poster Presenter	Evaluation of a novel cat allergy vaccine platform based on EMV-VLPs
09:10–09:15	**Anish Ghimire** Selected Poster Presenter	Programming immunity: a tetravalent mucosal nanovaccine for enhanced local and systemic antitumor responses
09:15–09:20	**Mariya Borgoyakova** Selected Poster Presenter	A bivalent COVID-19 mRNA vaccine combined B-cell and T-cell immunogens elicits strong humoral and cellular immune response in mice
09:20–09:25	**Muhammad Usman** Selected Poster Presenter	Biomaterial-Based Delivery Systems: Nanoparticles, Hydrogels & Microneedles in Shaping Vaccine Efficacy
09:25–09:30	**Min Xuan Keh** Selected Poster Presenter	Immunogenicity Study of Chimeric Secretory IgA: TB Multi-Epitopes Protein as Vaccine Candidate in Development of Mucosal Vaccine Against Tuberculosis
09:30–09:35	**Banjo Christianah Tolani** Selected Poster Presenter	Challenges and Prospects of Vectored Vaccine Platforms in the Nigerian Public Health System
09:35–09:40	**Oumaima Bounar** Selected Poster Presenter	Acceptance of HPV vaccination among adolescent girls in the EMRO region: preliminary results of a systematic review
09:40–09:45	**Verónica Araceli Márquez Escobar** Selected Poster Presenter	Assessment of Zein Nanoparticles as Carriers of SARS-CoV-2 Antigens
09:45–09:50	**Carlos Hernández** Selected Poster Presenter	Generation and characterization of zein nanoparticles conjugated with folic acid as a proposal for oral vaccine nanocarriers
09:50–09:55	**Luisa Helena De Oliveira Lima** Selected Poster Presenter	Análise da cobertura vacinal de crianças de 24 meses de idade em Teresina-PI: inquérito domiciliar
09:55–10:00	**Ayesha Zahid** Selected Poster Presenter	Development of a Novel Multi-component Vaccine to Address the Burden of Otitis Media in High-Risk Populations
10:00–15:00	**BREAK**	

Session 3. Models for Vaccine Development and Evaluation

Time: 15:00 (CET, Basel) / 08:00 (EDT, New York) / 21:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
15:00–15:10	*Welcome from the Session Chair* ***Prof. Dr. Jorge H. Leitão***	
15:10–15:40	**Professor Paulo Bettencourt** Keynote Speaker	Antigen discovery for malaria vaccines using immunopeptidomics
15:40–16:05	**Alexander Badten** Invited Speaker	Evaluation of Highly Conserved Burkholderia pseudomallei Proteins as pan-Burkholderia Vaccine Antigen Candidates
16:05–16:20	**Qing He** Selected Speaker	Impact of Two-Dose Varicella Vaccination on Incidence in Guangzhou: An Interrupted Time Series Study
16:20–16:35	**Haobo Kang** Selected Speaker	Adverse events of mRNA vaccine: mechanisms, risks and management
16:35–16:50	**Eman abd elmunem Shosha** Selected Speaker	Successive efficacy evaluation of various commercial live-attenuated avian coronavirus vaccination schedules against challenge with circulating field strain of genotype 23 lineage
16:50–17:05	**Isabela Karina Vilas Boas** Selected Speaker	Hepatitis B birth dose vaccination coverage in Brazil (2016–2025): a temporal analysis based on national health data
17:05–17:20	**Carlos Domínguez Vargas** Selected Speaker	Conceptual Design of a Dual-Function saRNA-LNP Vaccine Encoding Mosaic HIV Antigens and Intracellular Antiviral Peptides: Framework for Therapeutic HIV Vaccination

17:20–17:35	**Amany Hassan** Selected Speaker	Novel Immunopeptidomic Insights into EHEC O157:H7 Immune Evasion in Cattle: Implications for Rational T-Cell-Based Vaccine Design

28th November 2025 (Friday)

Session 5. New Methods for Vaccine Delivery
Session 4. New Approaches for Vaccine Adjuvants

Time: 9:00 (CET, Basel) | 03:00 (EDT, New York) | 16:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
09:00–09:10	*Welcome from the Session Chair* ***Prof. Dr. Silvio Tafuri***	
09:10–09:35	**Prof. Dr. Jose Lorenzo Valencia Martin** Keynote Speaker	Integrating enhanced vaccines and advanced delivery for Influenza control in High-Risk Patients: from innovation to population health
09:35-10:00	**Professor Claudia Maria Trombetta** Keynote Speaker	Overview of Serological Techniques for Influenza Vaccine Evaluation
10:00-10:20	**Dr. Antonio Di Lorenzo** Invited Speakers	New vaccine delivery systems and vaccine hesitancy: opportunities and challenges for a shifting scenery
10:20-10:35	**Atieh Rezvankhah** Selected Speaker	Targeting Epstein–Barr Virus With Nanocarriers: In Vitro Evaluation of a Liposomal Candidate
10:35-10:50	**Vladimir A. Yakovlev** Selected Speaker	Comparative analysis of the immunogenicity of mRNA-H5 vaccine delivered by needle-free jet injection and lipid nanoparticles
10:50-11:05	**Ramireddy Bommireddy** Selected Speaker	Bivalent virus like particle (VLP)-based delivery of SARS-CoV-2 spike RBD-GM-CSF fusion protein induces durable and protective response
11:05-11:20	**Fangfeng Yuan** Selected Speaker	Selection, Design and Immunogenicity Studies of ASFV Antigens for Subunit mRNA Cocktail Vaccines with Specific Immune Response Profiles
11:20-11:30	*Welcome from the Session Chair* ***Prof. Dr. Srinivasa Reddy Bonam***	
11:30-12:00	**Professor Jagadeesh Bayry** Keynote Speaker	Targeting Regulatory T Cells in Vaccination: Rationale and Strategies
12:00-12:25	**Dr. Kishore R. Alugupalli** Invited Speaker	Turbo: an adjuvant central to the immunogenicity of bacterial glycoconjugate subunit vaccines
12:25-12:40	**Xinyuan Chen** Selected Speaker	Mechanistic studies reveal crucial roles of inducible HSP70 in radiofrequency adjuvant effects and low-level local inflammation
12:40–12:55	**Haroon Afzal** Selected Speaker	Intrinsic Adjuvant Effect of Lipoprotein Signal Peptide in a Recombinant PEDV Subunit Vaccine

Session 1. Mucosal Vaccines for Respiratory Disease

sciforum-142049: Evaluation of a novel cat allergy vaccine platform based on EMV-VLPs

Mahsa Asgari [1,2,*], Martin Bachmann [1,2,3], Alessandro Pardini [1,2,4], Boran Li [1,2,4] and Lan Yang [1,2]

[1] Department of BioMedical Research, University of Bern, Bern, Switzerland.
[2] Department of Rheumatology and Immunology, University Hospital Bern, Bern, Switzerland.
[3] Nuffield Department of Medicine, Centre for Cellular and Molecular Physiology (CCMP), The Jenner Institute, University of Oxford, Oxford, UK
[4] Graduate School of Cellular and Biomedical Sciences, University of Bern, Bern, Switzerland.

Introduction

Cat allergies are predominantly caused by the major cat allergen Fel d 1. Vaccination against Fel d 1 is an emerging approach for cat allergy immunotherapy, with the goal of generating strong Fel d 1-specific IgG responses, which protect from allergy. In this study, we assessed the immunogenicity of a novel vaccine based on Eggplant Mosaic Virus (EMV) virus-like particles (VLPs) engineered to display Fel d 1. Our aim was to compare the impact of administration routes and prime-boost strategies on immune responses in mice.

Methods

Fel d 1 was genetically fused to the EMV capsid protein and expressed in *E. coli*. Mice were immunized with EMV-Fel d 1 VLPs, control EMV VLPs alone, or recombinant Fel d 1 protein using homologous or heterologous prime-boost regimens via subcutaneous or intranasal routes. Serum samples were collected to evaluate the Fel d 1-specific IgG responses using ELISA.

Results

We found that both homologous and heterologous vaccination strategies led to strong Fel d 1-specific IgG responses, with levels increasing after the booster dose. The average log(OD_{50}) value rose from ~2.2 on day 14 (after prime) to ~3.6 on day 28 (after boost). By day 28, the IgG1, IgG2b, and IgG3 subclasses were prominently elevated, whereas IgG2a levels remained comparatively low. The avidity of Fel d 1-specific IgG improved following the booster doses. Interestingly, priming with the EMV-Fel d 1 VLPs resulted in robust IgG responses, regardless of the boosting agent—even when boosted with recombinant Fel d 1 protein.

Conclusions

EMV-Fel d 1 VLP vaccines triggered robust and specific IgG responses, regardless of the prime-boost strategy used. These results support the continued development of EMV-based VLP platforms as a promising approach for cat allergy immunotherapy.

sciforum-141311: Immunogenicity Study of Chimeric Secretory IgA: TB Multi-Epitopes Protein as Vaccine Candidate in Development of Mucosal Vaccine Against Tuberculosis

Min Xuan Keh [1,*], Nur Ain Mohd Asri [2], Rapeah Suppian [1], Mohd Nor Norazmi [2,3] and Frank Camacho [4,5]

[1] School of Health Sciences, Universiti Sains Malaysia, Health Campus, Kubang Kerian, 16150, Kelantan Darul Naim, Malaysia.
[2] School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia.
[3] Malaysia Genome and Vaccine Institute, National Institutes of Biotechnology Malaysia, 43000 Kajang, Selangor Darul Ehsan, Malaysia
[4] Recombinant Biopharmaceuticals Laboratory, Pharmacology Department, School of Biological Sciences, Universidad de Concepcion, Concepcion, Chile
[5] Center for Biotechnology and Biomedicine Spa, Concepcion, Chile

Introduction

Tuberculosis (TB), caused by Mycobacterium tuberculosis (Mtb), remains one of the most common infectious diseases worldwide. Considering that Mtb primarily infects the lungs, it may be more effective to match the route of infection to the route of vaccination when developing TB vaccines, in order to stimulate both systemic and mucosal immunity. This study explores the development and evaluation of a novel mucosal TB vaccine utilizing TB multi-epitopes.

Methods

The vaccine candidate was developed by engineering recombinant epitopes, including Ag85b, Acr, and RpfE, combined with SIgA. The constructs were cloned into AAV vectors. AAV vectors carrying the construct were co-transduced into mammary gland of goat, and milk was collected. The chimeric protein was purified from milk. BALB/c mice (n=5 per group) were divided into four main groups:PBS only, BCG+PBS, chimeric protein (Prot), and BCG with protein (BCG-Prot). The mice were immunized with 10 µg/ml chimeric protein intranasally, weekly, for three doses. After two weeks, the mice were sacrificed, and their splenocytes were cultured to evaluate their cellular responses. The IgG and IgA levels in serum, saliva, and lung lavage were measured using ELISA.

Results

Mice immunized with recombinant protein, especially those primed with BCG, showed higher IgG and IgA levels compared to other groups. With regard to cellular response, a significant increase in the percentage of activated CD4+ and CD8+ T-cells, memory cells, and cytokines production can be observed in BCG–protein group.

Conclusions

A protein complex formed by TB multi-epitopes and the secretory component can be expressed and purified in milk samples. Our study demonstrated that recombinant protein vaccine enhances mucosal immunity with intranasal immunization. The significant increase in humoral and cellular immune responses in mice, particularly in BCG-primed groups, highlights the potential of this vaccine as a booster candidate with BCG.

Session 2. Vectored Vaccines

sciforum-142079: Challenges and Prospects of Vectored Vaccine Platforms in the Nigerian Public Health System

Banjo Christianah Tolani * and Taiwo Odunayo Esther

Department of Medical Microbiology and Parasitology, College of Medicine, University of Lagos, Lagos, Nigeria, 5256, Marina, Lagos, Nigeria.

Background

Nigeria faces ongoing public health challenges from emerging and re-emerging viral infections, including Lassa fever, yellow fever, and COVID-19. In such settings, conventional vaccine strategies have often proven insufficient for timely outbreak response. Viral-vectored vaccines offer a promising alternative due to their strong immunogenicity, single-dose potential, and scalability.

Objective

This review aims to assess the key challenges and future opportunities for integrating viral vectored vaccine platforms into Nigeria's public health system.

Methods

A secondary data review was conducted using peer-reviewed literature, national reports, and global health databases published between 2020 and 2024. Sources were selected based on relevance to vectored vaccines, public health infrastructure, and infectious disease response in Nigeria.

Results

The review identified major obstacles to adoption, including limited local vaccine manufacturing capacity, cold-chain infrastructure gaps, and regulatory delays. Public trust and misinformation also remain significant barriers. However, recent successes with vectored vaccines for Ebola and COVID-19 in Africa suggest high potential for broader use. Nigeria's growing biomedical research capacity, combined with strategic partnerships, could enhance deployment in future outbreaks.

Conclusions

Despite infrastructural and regulatory challenges, vectored vaccine platforms have significant potential in Nigeria. Advancing their adoption will require investment in local production, community engagement, and streamlined approval processes. These efforts can improve epidemic preparedness and health system resilience.

sciforum-141921: Development and Preliminary Characterization of a Baculovirus Pseudotyped with Andes Virus Envelope Glycoproteins

Belén Berta Angélica Jerez Monsalves [1,*], Bryan Mangui Catota [1,2], Pablo Ignacio Castro Henriquez [1], Fátima Reyes López [1,2], Viana Manrique Suarez [1,3], Nicolas Pinto Gutiérrez [1], Frank Camacho Casanova [2] and Oliberto Sánchez Ramos [1]

[1] Recombinant Biopharmaceutical Laboratory, Department of Pharmacology, Faculty of Biological Sciences, University of Concepción, 4070409, Chile
[2] Bioprocesses and Combinatorial Biology Laboratory, Department of Pharmacology, Faculty of Biological Sciences, University of Concepción, 4070409, Chile
[3] Biotechnology and Bioprocesses Laboratory, Department of Pathophysiology, Faculty of Biological Sciences, University of Concepción, 4070409, Chile

Hantaviruses infect a range of animal hosts, with rodents serving as reservoirs and transmitting the virus to humans through aerosols of their secretions and excretions. These zoonotic infections can lead to Hantavirus Cardiopulmonary Syndrome (HCPS), which in Chile and Argentina is caused by the Andes virus (ANDV). ANDV is particularly concerning due to its >40% mortality rate and unique capacity for person-to-person transmission. To date, no vaccine or therapeutic has been approved by the FDA or equivalent agencies.

In this work, the GPC gene fragment of ANDV, which encodes the envelope glycoproteins Gn and Gc, was integrated into the Autographa californica multiple nucleopolyhedrovirus (AcMNPV) genome using the MultiBac system. The construct was designed for dual expression under the polyhedrin (Polh) promoter for insect cells and the CMV promoter for mammalian cells. Although the GPC fragment was placed under both promoters, only robust expression under Polh has been confirmed, guiding current optimization efforts for mammalian expression. The resulting pseudotyped baculovirus showed strong expression and was successfully amplified to titers exceeding 10^8 in Sf21 and Sf9 insect cells. The presence and localization of the glycoproteins were confirmed by Western blot using hybridoma-derived monoclonal antibodies and by indirect immunofluorescence assay (IFA). Ongoing work includes immunogold electron microscopy to visualize the ANDV´s glycoproteins on the virion surface and inoculation studies in Syrian hamsters to evaluate immunogenicity and neutralizations activity. While current experimental efforts may prove encouraging, they will be critical for establishing the immunogenic potential of the system and confirming its relevance as a vaccine platform. Although baculovirus-based pseudotyped vaccine candidates have been developed for other pathogens, this system represents a novel application in the context of ANDV. Its modular design and engineering flexibility may further support adaptation for antigen delivery or evaluation in other emerging infectious diseases.

sciforum-141889: The Receptor binding domain 2 (RBD2) of binary toxin (CDT) as a promising vaccine candidate protects both mice and hamsters against CDT challenge

Xingmin Sun [1,*], Shaohui Wang [1] and Yukihiro Nakanishi [2]

[1] Department of Molecular Medicine, Morsani College of Medicine, University of South Florida, 12901 Bruce B. Downs Blvd, Tampa, FL33612, USA
[2] Department of Pathology, Moffitt Cancer Center, 2902 USF Magnolia Drive, Tampa, FL 33612, USA

Clostridioides difficile infection (CDI) is primarily driven by two protein toxins, toxin A (TcdA) and toxin B (TcdB). Additionally, about 5–30% of *C. difficile* strains produce a third toxin, binary toxin (CDT), which is linked to higher morbidity and mortality rates in CDI. Vaccination is a cost effective approcah to prevent CDI. Current;y, no vaccine has been licenced against CDI. Major effects have been devloted to developing vaccines against TcdA and TcdB. How a fully ecctive vaccine should target all 3 toxins. CDT consists of an enzymatic component (CDTa) and a binding/translocation component (CDTb), the latter facilitating CDTa entry into host cells. CDTb contains two receptor-binding domains (RBD1 and RBD2), with RBD2 playing a critical role in host cell toxicity, making it a promising target for intervention.

In this study, we assessed the homology and immunogenicity of RBD2. Our in-silico analyses revealed that RBD2 is highly conserved across diverse toxinotypes and ribotypes. Immunization of mice and hamsters with RBD2 elicited robust IgG/A antibody responses against CDT. Notably, vaccinated mice were fully protected against lethal systemic CDT challenge, and hamsters were completely protected against a lethal oral spore challenge with the CDT-only *C. difficile* strain DSM101085. Furthermore, we demonstrated for the first time that CDT is lethal in both animal models, causing significant damage to the colon, cecum, and spleen—a previously unreported finding. Collectively, our data highlight RBD2 as a promising vaccine component for CDI prevention.

Session 3. Models for Vaccine Development and Evaluation

sciforum-135250: Análise da cobertura vacinal de crianças de 24 meses de idade em Teresina-PI: inquérito domiciliar

Pallysson Paulo da Silva [1], Luisa Helena De Oliveira Lima [2,*], Edina Araújo Rodrigues Oliveira [2], José Cássio de Moraes [3], Rita Barradas Barata [4], Ana Paula França [4], Carla Magda Allan Santos Domingues [5] and Maria da Gloria Teixeira [6]

[1] Municipal Health Foundation, Teresina, Piauí, Brazil
[2] Federal University of Piauí, Picos, Piauí, Brazil
[3] Faculty of Medical Sciences of the Santa Casa of São Paulo, São Paulo, São Paulo, Brazil
[4] Faculty of Medical Sciences of the Santa Casa of São Paulo, São Paulo, São Paulo, Brazil
[5] Independent consultant, Federal District, Brasília, Brazil
[6] Federal University of Bahia, Institute of Public Health, Salvador, Bahia, Brazil

Objective: The aim of this study was to analyze vaccination coverage at 24 months of age among children born in 2017 and 2018, residing in Teresina, Piauí. Methods: This was an analytical, cross-sectional, household survey study, with cluster sampling of census tracts stratified according to socioeconomic conditions (A: high; B: medium; C: low; D: very low). Socioeconomic data were obtained through structured interviews with guardians, and vaccination records were obtained through photographs of the vaccination booklet. Indicators of coverage, access, adherence, and abandonment of vaccination were estimated using percentage frequencies and 95% confidence intervals (95% CI), applying sample weights. Crude (OR-b) and adjusted (OR-a) odds ratios were calculated using univariate and multivariate logistic regression to identify factors associated with vaccination incompleteness. We considered basic coverage to be the application of BCG (1 dose), Hepatitis B (1), Pentavalent (3 doses), IPV (3), VORH (2), Pneumococcal-10 (2), Meningococcal-C (2) and Yellow Fever (1). Complete coverage included the basic scheme plus MMR (2), boosters of Pneumococcal-10, Meningococcal-C, OPV and DTP (1 each), Hepatitis A (1) and Varicella (1). Results: The final sample of 899 children presented complete vaccination coverage of 63.6% (n=571; 95% CI: 55.49–71.07), being higher in stratum B (74.9%; 95% CI: 60.65–85.31). Incompleteness of the basic scheme was associated with crowded households (OR-b=2.79) and mothers with more than one child (OR-b=1.44; OR-a=2.60). For the complete scheme, it was associated with maternal multiparity (OR-b=1.19; OR-a=1.59), 9–12 years of schooling (OR-b=2.30), and family income >BRL 8,000 (OR-b=3.02; OR-a=6.25). There was a lower chance of incompleteness among children in fourth position or higher in the birth order (basic: OR-a=0.02; complete: OR-a=0.15) and among mothers with ≥16 years of schooling (basic: OR-b=0.33; OR-a=0.22). Conclusion: Insufficient and heterogeneous vaccination coverage was observed, with disparities between socioeconomic strata, between basic and complete schemes and divergence in relation to the SI-PNI data.

sciforum-144371: Hepatitis B birth dose vaccination coverage in Brazil (2016–2025): a temporal analysis based on national health data

Isabela Karina Vilas Boas [1,*], Ana Carolina Inacio Ribeiro dos Santos [2], Sofia Galvão Lima [1], Milena Dias da Silva [1], Ana Carolina Sgarioni Viapiana [1], Alana Tálita Marmol [1] and Fernanda Dei Ricardi [1]

[1] Academic of Medicine, School of Medicine, Federal University of Health Sciences of Porto Alegre (UFCSPA), Porto Alegre, 90050-170, Brazil
[2] Federal University of Paraná , Campus Ciências da Saúde, 80060-240, Curitiba, Brazil

Introduction

Hepatitis B is a potentially severe viral infection, associated with the risk of progression to cirrhosis and hepatocellular carcinoma (WHO, 2024). Vaccination, available through the Brazilian Unified Health System (SUS) for all unvaccinated individuals, is the main preventive measure (Brazil, 2023). In children, the schedule includes four doses: at birth and at 2, 4, and 6 months of age, with the last one administered as part of the pentavalent vaccine. The birth dose, recommended within the first 24 hours of life and up to the 30th day, is critical to preventing vertical transmission (CDC, 2023; Brazil, 2022). The national vaccination coverage (VC) target for this dose is 95% (Brazil, 2023). VC is calculated by dividing doses administered by the number of live births, multiplied by 100 (Brazil, 2021). This study specifically assessed the coverage of the hepatitis B birth dose, without analyzing the completion of the full vaccination schedule.

Methods

This descriptive study used secondary data from the National Health Data Network (RNDS) on annual coverage of the hepatitis B birth dose administered within 30 days of life, from 2016 to 2025. For 2025, data up to May were included. Coverage was compared to the 95% target and analyzed descriptively. Only the birth dose was evaluated, excluding subsequent doses of the schedule.

Results

From 2016 to 2018, coverage ranged from 81.75% to 88.40%. In 2019, it declined to 78.57%, with sharper drops during the COVID-19 pandemic, reaching 65.77% in 2020 and 67.03% in 2021. Recovery was observed in 2022 (82.76%), reaching 84.54% in 2023, 94.90% in 2024, and 85.01% up to May 2025. No year consistently achieved the 95% target.

Conclusions

Coverage of the hepatitis B birth dose in Brazil has fluctuated over the past decade, with a pandemic-related decline and a partial recovery thereafter. As the analysis was limited to the birth dose, data on the completion of the full series were not included. Strengthening neonatal vaccination strategies is essential to ensuring the prevention of vertical transmission.

sciforum-139214: Novel Immunopeptidomic Insights into EHEC O157:H7 Immune Evasion in Cattle: Implications for Rational T-Cell-Based Vaccine Design

Amany Hassan [1,2,3,*], Annalisa Nicastri [4], Deepali Vasoya [5], Joana Alves [2], David L. Gally [2], Nicola Ternette [4,6], Timothy K. Connelley [2] and Alexander Corbishley [2]

1 Department of Veterinary Microbiology and Pathology, Washington State University, Pullman, WA 99164, USA
2 The Royal (Dick) School of Veterinary Studies and Roslin Institute, University of Edinburgh, Edinburgh, United Kingdom
3 Department of Animal Medicine, The Faculty of Veterinary Medicine, The University of Alexandria, Alexandria 21944, Egypt
4 The Jenner Institute, Nuffield Department of Medicine, The University of Oxford, Oxford, OX37BN, UK
5 UK Dementia Research Institute at University of Edinburgh, Hugh Robson Building, George Square, EH08 9XD
6 School of Life Sciences, University of Dundee, Dundee DD1 5EH, Scotland, UK

Enterohemorrhagic *Escherichia coli* (EHEC) O157:H7 causes life-threatening disease in humans, characterized by bloody diarrhea and, in severe cases, brain and kidney damage. Ruminants—especially cattle—serve as the primary reservoir, where the bacterium asymptomatically colonizes the recto-anal junction. Our previous research demonstrated a mucosal immune bias towards a Th1 profile, with antigen-specific $CD4^+$ and $CD8^+$ T-cell proliferation. Mathematical modeling in humans suggests that EHEC O157:H7 effector proteins have evolved mechanisms to reduce MHC Class I (MHCI) ligand density, allowing the pathogen to escape immune surveillance through impaired antigen presentation and $CD8^+$ T-cell recognition. In our study, we identified EHEC O157 peptides presented on infected bovine epithelial cells using peptide elution and mass spectrometry. The results revealed that most eluted peptides were derived from structural proteins with only one bacterial peptide—derived from the translocator effector protein EspF—but it did not meet the predicted binding threshold for the expressed MHCI alleles. Notably, two MHCI ligands originated from Intimin, a key bacterial adhesion factor crucial for cattle colonization, where one overlapped with a known $CD4^+$ T-cell epitope, representing a promising vaccine candidate. Our in vitro model, using a bovine epithelial cell line expressing BoLA-1*023:01 and autologous $CD8^+$ T cells, showed that EHEC O157 suppresses antigen-specific $CD8^+$ T-cell activation, suggesting that the bacterial-secreted effector interferes with peptide processing and/or MHCI loading. This study provides a novel insight into veterinary immunology, particularly in the context of extracellular pathogens. It highlights the importance of including both $CD4^+$ and $CD8^+$ T epitopes in rational vaccine design—an often underexplored strategy for extracellular pathogens like EHEC O157. By integrating immunopeptidomics, in silico prediction, and a bovine in vitro model, we establish a basis for next-generation vaccines to eliminate persistent infections and limit zoonotic transmission.

sciforum-140388: A bivalent COVID-19 mRNA vaccine combined B-cell and T-cell immunogens elicits strong humoral and cellular immune response in mice

Mariya Borgoyakova *, Andrey Rudometov, Ekaterina Starostina, Vladimir Yakovlev, Elena Tigeeva, Kristina Makarova, Danil Vahitov, Anna Zaykovskaya, Sergey Sharabrin, Denis Kisakov, Larisa Karpenko and Alexander Ilyichev

State Research Center of Virology and Biotechnology VECTOR, Rospotrebnadzor, 630559 Koltsovo, Novosibirsk Region, Russia.

Both humoral and cellular immune responses are known to be crucial in the fight against SARS-CoV-2.

The aim of this work was to evaluate the immunogenicity profile of a bivalent mRNA vaccine encoding a multi-epitope T-cell immunogen and a B-cell immunogen as a receptor-binding domain of the S protein of the SARS-CoV-2 virus in BALB/c mice.

Two mRNA vaccines were obtained: mRNA-BSI encoding fragments of the S, M, N, and E proteins of the SARS-CoV-2 virus enriched with the large number of T-cell epitopes and mRNA-RBD encoding the receptor-binding domain (RBD) of the SARS-CoV-2 S protein. BALB/c mice were immunized with 10 μg of individual mRNA preparations or a 10 μg + 10 μg mixture intramuscularly in LNP vehicles twice with a three-week interval.

RBD-specific ELISA and neutralization assay (Wuhan and Omicron (BA.5.2) strains) showed an 2–4-fold increase in antibody titers in sera of mice immunized with the mixture of mRNA constructs compared to the group of mice that received only mRNA-RBD (mRNA-BSI did not induce a humoral response).

A T-cell response assay showed that mice that received the bivalent mRNA vaccine had a higher level of IFN-γ T-cell activation compared to the group that recieved the individual mRNA vaccine. In addition, the increases of IL-2 and TNF-α were not particularly significant, and the absence of IL-4 was noted.

The results indicate the formation of a pronounced humoral and T-cell response and a Th1 shift in mice that received the bivalent mRNA vaccine, encoding B-cell and T-cell immunogens.

The study was carried out as part of the state assignment of the FBIS SRC Virology and Biotechnology "Vector" of Rospotrebnadzor.

sciforum-137765: Adverse events of mRNA vaccine: mechanisms, risks and management

Haobo Kang *, Shuaishuai Fu, Yuanzhe Li, Zhenchi Fang, Weijie Ding, Yuanhang Chang, Enqi Guan, Yubo Sun, Kun Yang, Xiyang Zhang and Dongbo Jiang

Department of Immunology, Basic Medicine School, Air-Force Medical University (the Fourth Military Medical University), Xi'an 710032, Shaanxi, China

Introduction

mRNA vaccines have been pivotal in combating COVID-19, yet their deployment is associated with reports of adverse events (AEs). A better understanding and study of adverse reactions can promote the advancement of vaccine technology. Therefore, this study comprehensively characterizes these AEs, elucidates underlying mechanisms, and proposes management strategies to advance vaccine safety.

Methods

A systematic literature search was conducted across ScienceDirect, PubMed, SpringerLink, and Web of Science from January 2019 to April 2025, using the search terms "mRNA vaccine adverse" in the title, abstract, and keywords. Global pharmacovigilance databases, including EudraVigilance, VAERS, and CANVA, were also included. After deduplication and relevance analysis of the literature, the required documents were obtained, based on whom AEs were classified according to anatomical systems and mechanisms. Finally, visual analysis was conducted to complete the study.

Results

According to the method above, 87 articles, comprising clinical trials and case reports, met the inclusion criteria, following the PRISMA workflow referring to academic standard. AEs were categorized by anatomical systems and mechanistic axes. Anatomically, AEs are classified into four categories: cardiovascular AEs, neurological AEs, inflammatory AEs and mucocutaneous disorders. Cardiovascular AEs included myocarditis, thrombosis, and systemic capillary leak syndrome. Neurological AEs encompassed headaches, acute transverse myelitis, Bell's palsy, and delirium. Mucocutaneous disorders featured urticaria, vitiligo, and oral ulcers. Inflammatory AEs involved IgA nephropathy, subacute thyroiditis, rhabdomyolysis, and autoimmune flares like SLE, RA. Mechanistically, AEs were categorized into three axes: host susceptibility, delivery system interactions, mRNA component immunogenicity.

Conclusions

mRNA vaccine AEs arise from complex interactions between host biology, delivery systems, and mRNA immunogenicity. Key strategies for mitigation include: nucleotide chemistry refinement like pseudouridine modification, codon optimization, tissue-targeted LNPs, tunable adjuvants, and biomarker-guided risk stratification. Future research must prioritize mechanistic insights into molecular mimicry and host-specific vulnerabilities to enable safer, precision-engineered mRNA platforms.

sciforum-142302: Conceptual Design of a Dual-Function saRNA-LNP Vaccine Encoding Mosaic HIV Antigens and Intracellular Antiviral Peptides: Framework for Therapeutic HIV Vaccination

Carlos Domínguez Vargas [1,*], Samantha Jonnue Ramírez-Flores [1], Jesús Eduardo García-Hernández [1], Dante Joel Márquez-González [1], Karen Fernanda Chávez-Hernández [1], Ramiro Josué Chávez-Hernández [1], Carina Mariel Álvarez-Dávalos [1], Paloma Marylí Prado-López [2], Aurora García-Gómez [1] and Ramsés Emiliano Martínez-Hernández [3]

[1] Medicine and Surgery, University Center of Health Sciences (CUCS), University of Guadalajara, Guadalajara, 44340, Mexico.
[2] Neuropsychology, University Center of Health Sciences (CUCS), University of Guadalajara, Guadalajara, 44340, Mexico.
[3] Medicine and Surgery, Faculty of Medical and Biological Sciences "Dr. Ignacio Chávez", Universidad Michoacana de San Nicolás de Hidalgo (UMSNH), Morelia, Michoacán, 58010, Mexico.

Introduction

Although antiretroviral therapy (ART) effectively suppresses Human Immunodeficiency Virus (HIV), it does not eliminate viral reservoirs, and lifelong ART remains necessary. We outline a conceptual framework for a therapeutic vaccine that combines two complementary strategies: (1) induction of broad antiviral immunity using conserved mosaic antigens, and (2) intracellular interference with viral replication through engineered antiviral peptides. This saRNA-LNP platform aims to achieve durable viral control without lifelong ART by simultaneously targeting immune evasion and viral replication pathways.

Methods

The proposed platform integrates (1) mosaic immunogens, such as self-amplifying RNA (saRNA) encoding computationally selected epitopes from Gag, Pol, Env, Tat and Rev, based on NetMHCpan predictions and the Los Alamos National Laboratory HIV database, aiming for broad clade coverage (>95%); and (2) antiviral peptides, including mRNA encoding inhibitors such as LEDGIN-like peptides that block integrase-LEDGF/p75 binding and dominant-negative reverse transcriptase variants (YIDD mutants). These are formulated in lipid nanoparticles (LNPs) containing DOTAP and anti-CD40 ligands to enhance dendritic cell targeting. Epitope conservation was assessed with IEDB, while Rosetta docking was used to model peptide binding to viral enzymes.

Results

In silico analyses suggest high population coverage (~98% for HLA-I/II), sustained antigen expression for over 14 days, and strong predicted peptide–enzyme interactions (Rosetta energies –7.5 kcal/mole). BLASTp comparisons indicated low cross-reactivity with human proteins. Note that these findings are entirely in silico.

Conclusions

This conceptual design proposes a dual-function vaccine that seeks to enhance HIV-specific immune responses while simultaneously disrupting viral replication as a novel antirretroviral therapy for HIV. The approach is quite ambitious and remains at an early theoretical stage. Experimental validation will be essential to determine its feasibility as a future therapeutic vaccination strategy.

sciforum-142207: Impact of Two-Dose Varicella Vaccination on Incidence in Guangzhou: An Interrupted Time Series Study

Qing He *, Yanhui Liu, Xing Ye and Lei Luo

Department of communicable disease control and prevention, Guangzhou center for disease control and prevention(Guangzhou health supervision institute), Guangzhou,541440, China

A one-dose varicella vaccination program for children aged 1-14 years was introduced in Guangzhou in 1999. Since November 2017, a two-dose varicella vaccination program has been implemented, with the first dose for children aged 12-24 months and the second dose for children aged 4-6 years. To evaluate the effectiveness of the two-dose varicella vaccination strategy in Guangzhou, we conducted an interrupted time series (ITS) analysis using monthly reported varicella incidence data (2011-2024) and demographic statistics. In total, 225,497 varicella cases were reported between January 2011 and December 2024. The annual average reported incidence rate from 2011 to 2024 was 106.59 per 100,000. Prior to the two-dose varicella vaccine intervention (2011-2017), the annual average reported incidence rate was 126.80 per 100,000, while the post-intervention (2018-2024) annual average reported incidence rate was 91.14 per 100,000. Varicella cases in Guangzhou exhibited a bimodal distribution, peaking primarily between October and January (accounting for 42.14% of all cases, n=95,023) with a secondary peak in May. For the general population, varicella incidence showed a non-significant pre-intervention increasing trend of 0.3% per month (t = 2.27, P = 0.294). Post-intervention, a significant level change of +7.719 per 100,000 (t = 10.024, P 0.001) was observed, with a slope change of -2.1% (t = -9.956, P 0.001). This corresponds to a sustained monthly decline in incidence of 1.8%, indicating a statistically significant long-term reduction. Across age groups, the 4-6-year-old group demonstrated the most substantial decrease (a 3.8% monthly reduction), followed by the 7-9-year-old group. All age groups exhibited statistically significant long-term declining trends. To optimize varicella control, we suggest a phased introduction of the two-dose vaccine into China's NIP, with Guangzhou as the pilot site focusing on 4-6-year-olds, while assessing the cost-effectiveness to guide future policy.

sciforum-141062: Successive efficacy evaluation of various commercial live-attenuated avian coronavirus vaccination schedules against challenge with circulating field strain of genotype 23 lineage

eman Abd El-Menum shosha [1,*], Sara AbdelNaser Mohamed [1], Ali Mahmoud Zanaty [2], Abd Elfattah ElZanaty [3], Karium Selium [2] and Ibrahim Eldaghayes [4]

[1] Virology department, Faculty of Veterinary Medicine, New Valley University, El-Khargia, Egypt.
[2] Gene analysis unit, Reference laboratory for quality control on poultry, animal health institute, Agriculture Research Center (ARC), Giza, Egypt.
[3] Poultry disease diagnosis and research department. Animal Health Research Institute, AHRI, Agricultural Research Center, Giza, Egypt
[4] Department of Microbiology and Parasitology, Faculty of Veterinary Medicine, University of Tripoli, Tripoli, Libya

Background

Infectious bronchitis virus (IBV) is a highly spreading, evolving virus that induces multiple manifestations, including respiratory, urinary, and reproductive symptoms, posing a significant threat to the local poultry industry. This study evaluated a variety of IBV vaccination regimens in broilers using commercially available live attenuated vaccines such as IB Primer, 793/B (4/91), IB-VAR2, and H120 against the local novel IBV-GI-23.3 strain.

Methods

The vaccines were administered to eight groups of SPF chicks either at 1 day age or at 1+14 days of age. The birds were then challenged with the NewValley-1-EGYIBV-GI23.3-2023 strain via the oculo-nasal route at 28 days post-vaccination, using 106 EID50/0.2 ml/chick. Ciliostasis activity and the scores for histopathological lesions were evaluated at 7days post-challenge (DPC). Virus shedding was monitored at 3, 5, and 7 DPC using the real-time RT-PCR method.

Results

The ciliostasis test indicated that the vaccinated groups receiving the IB Primer + 4/91 vaccine regime at 1 day age or at 1+14 days of age provided the highest levels of protection (65%, 68%). Similarly, administrating of IB Primer-VAR2 at 1+14 days of age demonstrated substantial protection (63%). Conversely, administering the H120+4/91 vaccination protocol at days 1 and 14 resulted in a moderate level of protection (53%). Tracheal IBV shedding quantification and subsequent assessment of trachea, proventriculus, bursa, and kidney degenerative changes were significantly lower in the vaccinated groups than in the control groups.

Conclusions

The heterologous combined IB Primer +4/91 program demonstrated the most significant protective efficacy against the IBV field challenge strains in broiler chickens compared to other vaccines.

sciforum-146927: Successive efficacy evaluation of various commercial live-attenuated avian coronavirus vaccination schedules against challenge with circulating field strain of genotype 23 lineage

Eman abd elmunem Shosha [1,*], Sara Abdelnaser Mohamed [1], Ali Mahmoud Zanaty [2], Abd Elfattah ElZanaty [3], Karim Selim [2] and Ibrahim Eldaghayes [4]

[1] Virology department, Faculty of Veterinary Medicine, New Valley University, El-Khargia, Egypt.
[2] Reference laboratory for quality control on poultry, Animal health in-stitute, Agriculture Research Center (ARC), Giza, Egypt.
[3] Poultry disease diagnosis and research department, Animal Health Research Institute, AHRI, Agricultural Research Center, Giza, Egypt
[4] Department of Microbiology and Parasitology, Faculty of Veterinary Medicine, University of Tripoli, Tripoli, Libya

Background

Infectious bronchitis virus (IBV) is a highly spreading, evolving virus that induces multiple manifestations, including respiratory, urinary, and reproductive symptoms, posing a significant threat to the local poultry industry. This study evaluated a variety of IBV vaccination regimens in broilers using commercially available live attenuated vaccines such as IB Primer, 793/B (4/91), IB-VAR2, and H120 against the local novel IBV-GI-23.3 strain.

Methods

The vaccines were administered to eight groups of SPF chicks either at 1 day age or at 1+14 days of age. The birds were then challenged with the NewValley-1-EGYIBV-GI23.3-2023 strain via the oculo-nasal route at 28 days post-vaccination, using 10^6 EID_{50}/0.2 ml/chick. Ciliostasis activity and the scores for histopathological lesions were evaluated at 7 days post-challenge (DPC). Virus shedding was monitored at 3, 5, and 7 DPC using the real-time RT-PCR method.

Results

The ciliostasis test indicated that the vaccinated groups receiving the IB Primer + 4/91 vaccine regime at 1 day age or at 1+14 days of age provided the highest levels of protection (65%, 68%). Similarly, administration of IB Primer-VAR2 at 1+14 days of age demonstrated substantial protection (63%). Conversely, administering the H120+4/91 vaccination protocol at days 1 and 14 resulted in a moderate level of protection (53%). Tracheal IBV shedding quantification and subsequent assessment of trachea, proventriculus, bursa, and kidney degenerative changes were significantly lower in the vaccinated groups than in the control groups.

Conclusions

The heterologous combined IB Primer +4/91 program demonstrated the most significant protective efficacy against the IBV field challenge strains in broiler chickens compared to other vaccines.

sciforum-143478: Trends in BCG Vaccination Coverage in Brazil (2016–2025): A Nationwide Analysis Based on Public Health Data

Isabela Karina Vilas Boas *, Sofia Galvão Lima and Milena Dias da Silva

Academic of Medicine, School of Medicine, Federal University of Health Sciences of Porto Alegre (UFCSPA), Porto Alegre, 90050-170, Brazil

Introduction

The BCG (Bacillus Calmette-Guérin) vaccine is used in Brazil to prevent severe forms of tuberculosis in children, including tuberculous meningitis and miliary tuberculosis. Under the National Immunization Program (PNI), BCG is administered in a single dose to children under one year of age, with a target coverage of 90%. Vaccination efforts are primarily conducted by the Unified Health System (Sistema Único de Saúde – SUS), Brazil's public, free, and universal healthcare system. Vaccination coverage (VC) is an indicator that measures the proportion of the vaccinated population relative to the total eligible. It is calculated by dividing the number of doses administered by the number of eligible individuals, multiplied by 100. For BCG, the denominator is based on the number of live births recorded in the Live Birth Information System (SINASC). This study aims to analyze BCG VC in Brazil from 2016 to 2025 using data exclusively from the National Health Data Network (RNDS), an official SUS database.

Methods

A descriptive study was conducted using secondary data from RNDS on annual BCG coverage from 2016 to 2025. Data for 2025 includes records up to May. Percentages were compared to the national target of 90% and analyzed descriptively.

Results

From 2016 to 2018, VC remained above 90%, peaking in 2018 (99.72%). Coverage declined starting in 2019 (86.67%), reaching the lowest levels in 2020 (77.14%) and 2021 (74.97%) during the COVID-19 pandemic. Recovery began in 2022 (90.09%), with 87.99% in 2023, 96.61% in 2024, and 87.91% reported through May 2025.

Conclusions

BCG coverage in Brazil showed significant variation over the last decade. The drop during the pandemic and subsequent recovery highlight the need for sustained immunization strategies and the strength of SUS data as a public health surveillance tool.

Session 4. New Approaches for Vaccine Adjuvants

sciforum-147364: Development of a Novel Multi-component Vaccine to Address the Burden of Otitis Media in High-Risk Populations

Ayesha Zahid

Institute for Glycomics, Griffith University, Gold Coast 4215, Queensland, Australia

Background and Aims

Otitis media (OM) is the most common childhood disease diagnosed among Australian children and the leading cause of hearing loss in Aboriginal and Torres Strait Islander children. Outer membrane vesicles (OMVs) represent a promising new adjuvant platform because they naturally mimic bacterial membranes and provide strong innate immune stimulation while also displaying high immunogenicity. In this project, we aimed to harness OMVs as an adjuvant system, while genetically modifying them to remove immunodominant, strain-variable proteins, thereby enhancing their potential to promote cross-protective responses when combined with conserved recombinant antigens.

Methods

Novel recombinant protein antigens from NTHi and *M. catarrhalis* were cloned, expressed in *E. coli*, and purified by immobilized metal affinity chromatography. Genetically modified *M. catarrhalis* OMVs were produced by engineering knockout mutants, purified by ultracentrifugation, and characterized for yield and composition. Mice were immunized with recombinant antigens formulated with these OMVs, and sera were analyzed by ELISA, and bactericidal assays with complement deposition assays in progress.

Results

Recombinant NTHi and *M. catarrhalis* antigens were successfully expressed and purified. Genetically modified OMVs with reduced strain variability were generated and characterized. ELISA data indicate that OMV-adjuvanted formulations elicit strong antigen-specific antibody responses in mice and provide broader coverage against both homologous and heterologous strains.

Conclusions

This study highlights the use of engineered OMVs as a novel adjuvant platform to enhance immunogenicity and broaden protection against diverse OM pathogens. The integration of recombinant protein antigens with adjuvant-active OMVs offers a promising new strategy to overcome the limitations of current vaccines for OM.

sciforum-145938: Intrinsic Adjuvant Effect of Lipoprotein Signal Peptide in a Recombinant PEDV Subunit Vaccine

Haroon Afzal * and Li-Ting Cheng

International Degree Program of Animal Vaccine Technology, National Pingtung University of Science and Technology, Neipu, Pingtung 912, Taiwan

The Porcine Epidemic Diarrhea Virus (PEDV) spike (S) protein is a key glycoprotein that mediates viral binding and entry, making it a prime target for subunit vaccine development. Within its S1 domain, the core neutralizing epitope (COE; residues 499–799) is rich in predicted B- and T-cell epitopes as well as neutralizing determinants, underscoring its strong immunogenic potential. This study explores whether fusing a bacterial lipoprotein signal peptide to the COE domain can enhance its antigenicity and protective efficacy by promoting lipidation-driven Toll-like receptor 2 (TLR2) activation. Two constructs were generated: COE with signal peptide (SP-COE) and COE without signal peptide. Their performance was assessed using in silico, in vitro, and in vivo approaches. Computational analyses confirmed broad B- and T-cell epitope coverage, stable structural models, and favorable receptor binding. In vitro, HEK-Blue hTLR2 reporter assays showed that SP-COE triggered significantly higher NF-κB activation compared to COE, validating enhanced TLR2 engagement. In vivo, SP-COE vaccination in mice resulted in stronger humoral and cellular immunity, evidenced by higher total IgG and virus-neutralizing antibody titers, robust cytokine responses (IFN-γ, IL-4), and increased $CD4^+$ T-cell activation. Collectively, these findings indicate that incorporating a lipoprotein signal peptide augments the immunogenicity and protective performance of the PEDV COE antigen, supporting its role as a built-in adjuvant for rational subunit vaccine design.

sciforum-146564: Mechanistic studies reveal crucial roles of inducible HSP70 in radiofrequency adjuvant effects and low-level local inflammation

xinyuan chen *, Yan Cao and Zhuofan Li

Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy, University of Rhode Island, Kingston, RI 02881, USA

Introduction

Adjuvants play crucial roles in developing new and improved vaccines. Yet adjuvant discovery has been a slow process. We recently took a different approach to developing physical radiofrequency-based adjuvants (RFAs) to stimulate thermal tissue stress to enhance vaccine-induced immune responses. In murine models, RFA profoundly enhanced intradermal influenza-vaccine-induced humoral and cellular immune responses, with an adjuvant potency comparable to that of commonly used chemical adjuvants. RFA also showed potent dose-sparing effects for influenza vaccines, with an adjuvant potency superior to that of the MF59-like AddaVax adjuvant. Interestingly, the physical RFA only induced transient, low-level local inflammation without a significant change in the local proteome, in sharp contrast to chemical adjuvants. It is intriguing how RFA induces potent adjuvant effects without the induction of strong local inflammation or a significant change in the proteome.

Methods

This study focuses on uncovering the underlying action mechanisms of the physical RFA and its low-level local inflammation in murine models. Mice were subjected to RFA or Sham treatment, followed by intradermal injection of a fluorescence antigen. Inducible HSP70 expression and antigen uptake in diverse skin cell types were analyzed through flow cytometry. We further used HSP70 KO mice to evaluate the potential roles of HSP70 in antigen uptake and RFA-induced cytokine release.

Results

We found that RFA could induce rapid heat-shock protein 70 (HSP70) synthesis in the dendritic cells (DCs), which could release extracellularly and bind intradermally injected antigens. Furthermore, inducible HSP70 played crucial roles in mediating enhanced antigen uptake following RFA treatment. Interestingly, HSP70 suppressed the RFA-induced TLR4/NFκB signaling pathway and IL-6 release.

Conclusions

These studies indicate dual roles of in situ-induced HSP70 in antigen delivery and immunoregulation. This work supports the further development of alternative RFA to boost influenza vaccination with good local, systemic, and long-term safety.

Session 5. New Methods for Vaccine Delivery

sciforum-145808: Assessment of Zein Nanoparticles as Carriers of SARS-CoV-2 Antigens.

Veronica Araceli Marquez-Escobar *, Sergio Rosales-Mendoza and Maria de Lourdes Betancourt-Mendiola

[1] Department of Recombinant Biopharmaceuticals, School of Chemical Sciences, Autonomous University of San Luis Potosí, San Luis Potosí, S.L.P., 78210, Mexico
[2] Department of Biotechnology, Center for Research in Health Science and Biomedicine, Autonomous University of San Luis Potosí, San Luis Potosí, S.L.P. 78210, Mexico

Nanoparticles offer a versatile antigen delivery vehicle for vaccines, enhancing immune responses and promoting robust immunity. Zein is a promising material for organic nanoparticle synthesis due to its unique attributes such as biodegradability, biocompatibility, and safety due to its natural origin. In this study, the potential of zein nanoparticles (ZNPs) used as nanocarriers was evaluated for an antigenic peptide (p30) and the receptor binding domain (RBD) from SARS-CoV-2 spike protein. ZNPs were synthesized by nanoprecipitation and characterization was performed using Dynamic Light Scattering (DLS) and Transmission Electron Microscopy (TEM). A cytotoxicity assay in the Vero cell line was performed prior to the in vivo test. The immunogenicity of ZNP conjugates was evaluated in BALB/c mice using an immunization scheme comprising three subcutaneous doses. Two different doses of ZNP-p30 conjugates were evaluated: a low dose (5 µg) and a high dose (10 µg). With regard to the the ZNP–RBD conjugates, only a 1 µg dose was tested. Results from DLS and TEM showed evidence of ZNP formation. According to the in vitro assay, ZNPs do not compromise cellular viability. In vivo assays demonstrated that total IgG levels with either 5 or 10 µg of ZNPs:p30 had comparable titers to the positive control group, suggesting that the formulation of ZNPs has adjuvant properties similar to alum. When IgG subclasses were analyzed, IgG1 predominated over IgG2a, suggesting that a Th2-bias (humoral) response is induced. As expected, IgM was elicited after the first immunization, and decreased over time. Interestingly, the IgG antibodies produced could recognize the full spike protein of SARS-CoV-2. Regarding ZNP:RDB formulation, the results showed that the total IgG levels were comparable with the adjuvanted group. In conclusion, ZNPs are promising carriers for subcutaneous immunization with the SARS-CoV-2 antigens used, eliciting an immune response comparable to that produced by the commercial adjuvant.

sciforum-147419: Generation and characterization of zein nanoparticles conjugated with folic acid as a proposal for oral vaccine nanocarriers

Carlos Hernández-Alejo *, María de Lourdes Betancourt-Mendiola, Alejandra Wong-Arce and Sergio Rosales-Mendoza

[1] Biotechnology Section, Center for Research in Health Science and Biomedicine, Autonomous University of San Luis Potosí, Av. Sierra Leona 550, Lomas de San Luis, San Luis Potosí 78210, Mexico
[2] Recombinant Biopharmaceuticals Laboratory, School of Chemical Sciences, Autonomous University of San Luis Potosí, Manuel Nava 6, Av. Dr. Manuel Nava, San Luis Potosí 78210, Mexico

The use of nanoparticles (NPs) has been of great interest in the field of vaccinology for the generation and development of nanocarriers for new oral vaccines. Zein NPs have become a promising option since protein NPs show several advantages, such as biocompatibility and a longer antigen release. To use these NPs as an oral vaccine model, they can be conjugated with a molecule that improves their recognition by the intestinal dendritic cells. Folic acid has been used due its high affinity for dendritic cells, making it an ideal molecule for conjugation with NPs. In this work, a relatively simple and highly reproducible method was established to generate zein-based nanocarriers: pure zein NPs and zein NPs with covalently linked folate. Two different strategies for covalent bond formation between the zein NPs and NHS–folate were evaluated, one for the formation of zein NPs with folate on their surface (ZN-FA NPs) and another one for zein NPs with folate both on their surface and inside of them (ZN(FA) NPs). The obtained NPs were characterized in terms of shape, size, polydispersity, and zeta potential using dynamic light scattering (DLS) analysis and visualized via transmission electron microscopy (TEM). The synthesized ZN-FA NPs and ZN(FA) NPs showed a spherical shape with low polydispersity and an average particle size of 229.88.42 ± 59.52 nm and 293.70 ± 69.19 nm, respectively, according to the TEM analysis, while the DLS analysis showed a hydrodynamic radius of 366.42 ± 39.84 nm and 455.77 ± 91.55 nm, respectively. Fourier-transform Infrared spectroscopy (FTIR) confirmed the successful conjugation of folate to the NPs, while UV-Vis spectrophotometry determined the concentration of folate in the NPs and a protein adsorption efficiency of 45.44% and 41.00% for ZN-FA NPs and ZN(FA) NPs, respectively. Furthermore, cytotoxicity assays in the DC2.4 dendritic cell line demonstrated that the NPs are not cytotoxic.

sciforum-144272: Biomaterial-Based Delivery Systems: Nanoparticles, Hydrogels & Microneedles in Shaping Vaccine Efficacy

Muhammad Nasir Bhaya [1], Muhammad Usman [2,*] and Riffat Maqsood [2]

[1] Department of Pathology, Faculty of Veterinary Science, University of Agriculture Faisalabad, 38000-Faisalabad, Pakistan.
[2] Faculty of Veterinary Science, University of Agriculture Faisalabad, 38000-Faisalabad, Pakistan.

Introduction

Vaccine efficiency depends upon antigen selection and appropriate delivery platform. Various biomaterials such as nanoparticles, hydrogels and microneedles are used as vaccine delivery systems to enhance antigen stability, control release kinetics, and modulate immune responses. These systems overcome limitations of traditional administration routes by enabling precise targeting of immune cells.

Method

Studies in recent few years have evaluated the importance of nanoparticle formulations (lipid-based, polymeric, and inorganic), hydrogel matrices (thermosensitive and injectable), and microneedle arrays (solid, coated, and dissolving) in vaccine delivery. Comparative analysis of various biomaterials was studied.

Results

Nanoparticle formulation demonstrated efficient co-delivery of antigen–adjuvant combinations and balanced humoral and cellular immunity. Hydrogels are responsible for improved memory T-cell responses and reduced booster requirements by causing sustainable antigen release over days to weeks. Microneedle arrays provide access to needle-free administration with rapid uptake by skin-resident dendritic cells, eliciting robust mucosal and systemic immunity.

Conclusions

Biomaterial-based vaccine delivery systems are a transformative approach to next-generation immunization strategies. Nanoparticles, hydrogels, and microneedles can improve vaccine potency, reduce cold-chain dependence, and broaden accessibility by enabling targeted, sustained, and minimally invasive antigen presentation. Future research integrating smart biomaterials with AI-driven antigen design plays crucial role in accelerating both infectious disease and cancer vaccine development.

sciforum-142285: Bivalent virus like particle (VLP)-based delivery of SARS-CoV-2 spike RBD-GM-CSF fusion protein induces durable and protective response

Ramireddy Bommireddy [1,*], Shannon Stone [2], Amany Elsharkawy [2], Kristen M Jacobsen [3], Christopher D Pack [3], Sampath Ramachandiran [3], Mehul S Suthar [4], Mukesh Kumar [2] and Periasamy Selvaraj [1]

[1] Department of Pathology and Laboratory Medicine, Emory University, Atlanta, Georgia, USA
[2] Department of Biology, College of Arts and Sciences, Georgia State University, Atlanta, Georgia, USA
[3] Metaclipse Therapeutics Corporation, Atlanta, Georgia, USA
[4] Pediatrics, Emory University, Atlanta, Georgia, USA

Several approaches have produced an effective vaccine against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). However, the durability and efficacy of the immune response against SARS-CoV-2 in aged individuals is limited. Our objective is to develop a vaccine using influenza virus-like particles (VLPs) by incorporating GPI-RBD-GM-CSF fusion protein and GPI-IL-12 by protein transfer and demonstrate its efficacy and durability against influenza and SARS-CoV-2 viruses.

We have developed a bivalent VLP vaccine for influenza and SARS-CoV-2 using VLP incorporated with glycosylphosphatidylinositol (GPI)-anchored Spike RBD of SARS-CoV-2 fused to GM-CSF as an adjuvant. GPI-anchored fusion protein of GM-CSF and the SARS-CoV-2 S1 RBD was incorporated into influenza VLPs by protein transfer to make a bivalent VLP vaccine. The efficacy of the bivalent VLP vaccine was tested in both young and aged mice.

Our results show that the bivalent VLP vaccine induced a strong antibody response and protected the mice from both influenza virus and mouse-adapted SARS-CoV-2 challenges, with vaccinated mice having less body weight loss and significantly lower lung viral titers compared to control mice. The anti-viral immunity is long lasting and protective in aged mice immunized either when they are young and allowed to age or vaccinated when they are old prior to virus challenge.

The results suggest that the bivalent VLP vaccine is a promising candidate for preventing influenza A and SARS-CoV-2 infections.

Funding: This work was supported by NIH/NIAID (SBIR Contract# 75N93019C00017 Amendment to Pack/Ramachandiran), and Intel Corporation for the Intel COVID-19 Global Technology Response Initiative grant.

sciforum-142119: Comparative analysis of the immunogenicity of mRNA-H5 vaccine delivered by needle-free jet injection and lipid nanoparticles

Vladimir A. Yakovlev *, Victoria R. Litvinova, Nadezhda B. Rudometova, Mariya B. Borgoyakova, Elena V. Tigeeva, Ekaterina V. Starostina, Ksenia I. Ivanova, Andrei S. Gudymo, Kristina P. Makarova, Danil I. Vahitov, Sergey V. Sharabrin, Svetlana I. Krasnikova, Lyubov A. Kisakova, Denis N. Kisakov, Tatiana N. Ilyicheva, Vasiliy Yu. Marchenko, Larisa I. Karpenko, Andrey P. Rudometov and Alexander A. Ilyichev

Department of Bioengineering, Federal Budgetary Research Institution State Research Center of Virology and Biotechnology «Vector», Rospotrebnadzor, Koltsovo, 630559, Russia

The development of a vaccine against influenza caused by highly pathogenic avian influenza (HPAI) viruses of the A/H5 subtype is a pressing issue due to concerns about the pandemic potential of this subtype. It is evident that mRNA vaccines possess a multitude of characteristics that are indispensable for the development of an influenza vaccine. In general, lipid nanoparticles (LNPs) are utilized for the delivery of exogenous mRNA into the cells of the body. Additionally, the needle-free jet injection (JI) method has emerged as a promising alternative to LNPs for mRNA delivery.

An experimental mRNA vaccine encoding a modified hemagglutinin (HA) trimer of the H5N8 influenza virus has been obtained. The HA gene was subsequently cloned into the pVAX-Cas1CC expression cassette, which carries the target gene under the control of the T7 promoter. The cassette also contains 5'- and 3'-untranslated regions of human α-globin and 100-nucleotide poly-(A)-tail. The mRNA was encapsulated in LNPs. Subsequently, BALB/c mice were immunized with mRNA delivered by LNPs and as "naked" mRNA by JI. The control groups consist of naïve mice, mice that have been immunized with a recombinant protein and LNPs without mRNA.

Studies have shown that mice, immunized with obtained mRNA delivered by LNPs and JI, can effectively stimulate humoral and T-cell immune responses. A comparative evaluation showed that mRNA-LNPs exhibited the highest levels of humoral immune response stimulation, while JI stimulated an immune response at lower levels that were nevertheless sufficient to protect animals from lethal infection with both homologous and heterologous H5Nx viruses. The data indicate that mRNA-H5 is a promising influenza vaccine candidate against the HPAI virus subtype A/H5 with pandemic potential.

This study was conducted by the Federal State Budgetary Institution State Research Center Vector of Rospotrebnadzor as part of a state assignment.

sciforum-130584: Selection, Design and Immunogenicity Studies of ASFV Antigens for Subunit mRNA Cocktail Vaccines with Specific Immune Response Profiles

Fangfeng Yuan * and Jianzhu Chen

Koch Institute for Integrative Cancer Research, Massachusetts Institute of Technology, 500 Main St Building 76-243, Cambridge, 02139, USA

The outbreaks African swine fever (ASF) in Eurasia have caused tremendous economic losses and the incursion to US would be disastrous to swine industry. Safe and effective vaccines have not been developed so far. Here, we report a novel ASFV mRNA vaccine designed with multiple rationalities to induce robust humoral and cellular immunities. Candidate vaccine antigens are selected by referring to homologs of protective antigens from the closely related vaccinia virus, known antigens eliciting strong host immune response, and viral capsid engineering for membrane-anchoring for optimal B cell engagement. To specifically induce strong T cell response, a T cell-directed vaccine antigen is designed by fusing multiple T cell epitopes (MTE) that are experimentally determined previously or predicted MHC-I high binders. Candidate antigens are formulated into lipid nanoparticle (LNP)- mRNA and further immunogenicity assessment in both mice and pigs reveals that different antigens elicits very distinct immune profiles including total antibody response, antibody effector functionality, and T cell response. Notably, the T cell-directed antigen induced robust cellular immunity. Furthermore, we demonstrated that multiple candidate cocktail vaccines based on distinct antigen immune profiles induced robust B cell and T cell immunities. Overall, The novel-designed vaccines coupled with mRNA technology shed light for an effective vaccine development against ASFV and strategies reported here can be utilized for developing vaccines against other large complex DNA viruses, such as monkeypox virus.

sciforum-147302: Targeting Epstein–Barr Virus With Nanocarriers: In Vitro Evaluation of a Liposomal Candidate

Atieh Rezvankhah * and Gamze Varan

Hacettepe University, Vaccine Institute, Department of Vaccine Technology, 06100 , Ankara, Turkey

Epstein–Barr Virus (EBV) is a prevalent oncogenic herpesvirus associated with infectious mononucleosis, several malignancies, and autoimmune diseases, yet no licensed vaccine exists despite decades of research. Liposomes, due to their biocompatibility, biodegradability, and ability to protect antigens, are attractive platforms for EBV vaccine delivery. In this study, a gp350-based subunit vaccine was designed using liposomal carriers adjuvanted with Monophosphoryl Lipid A (MPLA).

Different lipid compositions were used to prepare multiple vaccine formulations, which were systematically compared for physicochemical stability and performance. The formulations were characterized in terms of particle size, polydispersity index, SPAN, zeta potential, encapsulation efficiency, and in vitro antigen release profile. Through sequential evaluation, suboptimal candidates were eliminated, and further studies were conducted with the most promising formulations. The selected candidate demonstrated high encapsulation efficiency (>90%) along with favorable stability characteristics. Safety was confirmed by MTT assays in L929 fibroblasts and EBV-positive Daudi cells, where both empty and antigen-loaded liposomes exhibited acceptable cytocompatibility. Safety was confirmed by MTT assays in L929 fibroblasts and EBV-positive Daudi cells, where both empty and antigen-loaded liposomes exhibited acceptable cytocompatibility. Immunological activity was assessed in THP-1 monocyte-derived cells, demonstrating that the optimized formulation induced a balanced but effective cytokine profile, characterized by significant upregulation of TNF-α and IL-6, and moderate IL-10 expression.

In addition, ongoing analyses, including ROS generation and DNA damage evaluation using the Comet assay, are expected to provide further insights into oxidative stress responses and genomic safety. Together, these findings demonstrate that the optimized gp350-loaded, MPLA-adjuvanted liposomal formulation combines nanoscale stability, favorable safety, and robust immunostimulatory activity, highlighting its potential as a promising next-generation EBV vaccine candidate.

The authors wish to thank Hacettepe University Scientific Research Projects Coordination Unit for supporting this study as part of a Master's Thesis Project (*Project No: TYL-2024-21421)*

sciforum-142081: Thermostable and Needle-Free Vaccine Delivery Technologies: Prospects for Expanding Immunization Access in Nigeria

Banjo Christianah Tolani * and Taiwo Esther Odunayo

Department of Medical Microbiology and Parasitology, College of Medicine, University of Lagos, Lagos, Nigeria, 5256, Marina, Lagos, Nigeria.

Despite considerable progress in immunization efforts, Nigeria continues to face significant challenges in delivering vaccines to remote and underserved areas. The dependence on cold-chain infrastructure, coupled with vaccine hesitancy and limited healthcare access, has hindered equitable vaccine distribution. Recent advances in thermostable and needle-free vaccine delivery platforms offer promising alternatives that can improve immunization coverage, especially in hard-to-reach populations. This study aims to assess the challenges and opportunities associated with the deployment of thermostable and needle-free vaccine delivery technologies in Nigeria, with an emphasis on their applicability in low-resource and rural settings. This is a secondary data review based on recent literature and reports from 2020 to 2024. Sources included peer-reviewed journals, WHO technical documents, and national immunization data. Key indicators analyzed include vaccine storage requirements, ease of administration, cost-effectiveness, and public health outcomes. Thermostable vaccines—formulations that remain effective without strict cold storage—have shown promise in reducing vaccine wastage and improving delivery logistics. Additionally, needle-free technologies such as microneedle patches, jet injectors, and nasal sprays have demonstrated comparable immunogenicity to traditional methods and could address needle-associated fears and safety concerns. Although pilot studies have shown efficacy and acceptance, widespread adoption in Nigeria is limited by cost, regulatory bottlenecks, and healthcare worker training gaps. Thermostable and needle-free vaccine platforms represent a transformative step toward equitable vaccine access in Nigeria. Policy reforms, investment in scalable technologies, and pilot programs are crucial for integration into national immunization schedules. Further studies should evaluate community acceptance and long-term cost-effectiveness in the Nigerian context.

Session 6. Cancer Vaccines and Immunotherapy

sciforum-136934: Single-cell immune profiling reveals potent anti-tumor immune response in virus-like particle vaccine and anti-CTLA4 treatment through lymphatic delivery

Wendao Liu [1,2,*], Sarat Kumar Wiggins [3], David Wiggins [3], Fred Christian Velasquez [2], Songlin Zhang [4], Arnau Solé Casaramona [5,6,7], Martin F. Bachmann [5,6,8], Yi Han [9], Tao Wang [9], Mona O. Mohsen [5,6,10], Zhongming Zhao [1,2] and Eva M. Sevick-Muraca [1,3]

[1] The University of Texas MD Anderson Cancer Center UTHealth Houston Graduate School of Biomedical Sciences, Houston, TX, USA
[2] Center for Precision Health, McWilliams School of Biomedical Informatics, The University of Texas Health Science Center at Houston, Houston, TX, USA
[3] Center for Molecular Imaging, The Brown Foundation Institute of Molecular Medicine, The University of Texas Health Science Center at Houston, Houston, TX, USA
[4] Department of Pathology and Immunology, Baylor College of Medicine, Houston, TX, USA
[5] Department of Rheumatology and Immunology, Inselspital, University of Bern, Bern, Switzerland
[6] Department for BioMedical Research, University of Bern, Bern, Switzerland
[7] Graduate School for Cellular and Biomedical Sciences (GCB), Bern, Switzerland
[8] Nuffield Department of Medicine, The Henry Welcome Building for Molecular Physiology, The Jenner Institute, University of Oxford, Oxford, UK
[9] Department of Bioinformatics and Computational Biology, University of Texas MD Anderson Cancer Center, Houston, TX, USA
[10] DeepVax GmbH, 8487 Rämismühle, Zürich, Switzerland

Introduction

Immune checkpoint inhibitors such as anti-CTLA-4 enhance anti-tumor immunity but are often limited by immune-related adverse events (irAEs) caused by non-specific T cell activation. Virus-like particles (VLPs) presenting tumor antigens offer a strategy to selectively prime tumor-specific T cells, potentially enhancing therapeutic efficacy while minimizing off-target toxicity.

Methods

We investigated a lymphatic-targeted immunotherapy approach in a B16F10 melanoma mouse model. Mice received VLPs carrying the tumor-associated antigen PMEL via intradermal vaccination to a non-tumor-draining lymph node (non-tdLN), followed by αCTLA-4 checkpoint blockade delivered either systemically (intravenous) or regionally (intradermally to the same non-tdLN). Single-cell RNA and TCR sequencing were used to characterize immune cell phenotypes and T cell clonal dynamics in the tumor microenvironment. Functional assays and histopathological analysis assessed tumor-specific activity and irAE profiles.

Results

Regional αCTLA-4 delivery synergized with VLP vaccination to promote infiltration and clonal expansion of non-exhausted $CD8^+$ effector and $CD4^+$ Th1 T cells while reducing regulatory T cells. VLPs alone induced PMEL-specific $CD8^+$ T cells, and regional αCTLA-4 further amplified this response. Functional assays confirmed increased tumor-specific T cell activation with minimal bystander T cell infiltration into normal tissues. Additionally, αCTLA-4 promoted macrophage activation, upregulating interferon signaling and T cell costimulation pathways.

Conclusions

Lymphatic-targeted combination therapy with VLP vaccination and regional αCTLA-4 delivery drives potent, tumor-specific immune responses while minimizing systemic toxicity. This approach offers a promising strategy to improve the efficacy and safety of cancer immunotherapy.

sciforum-142073: Acceptance of HPV vaccination among adolescent girls in the EMRO region: preliminary results of a systematic review

Oumaima Bounar [1,*], Omayma Benbrik [1,2], Afaf Bouqoufi [2], Yassmine El Moussaoui [2], Imad Chakri [1] and Laila Lahlou [1]

[1] Laboratory of Community Medicine, Preventive Medicine, Public Health and Hygiene, Faculty of Medicine and Pharmacy of Agadir, Ibn Zohr University, Agadir, Morocco.
[2] Laboratory of Research and Innovation in Health Sciences, Faculty of Medicine and Pharmacy of Agadir, Ibn Zohr University, Agadir, Morocco.

Introduction

Cervical cancer is the fourth most common cancer in women worldwide, and it is caused by persistent infection with the human papillomavirus (HPV). For most countries in the Eastern Mediterranean Region, the incidence rate of cervical cancer was estimated at 10 cases per 100,000 women in 2022. In fact, morbidity and mortality rates remain high due to low acceptance of the HPV vaccine despite widespread vaccination campaigns. This systematic review aimed to estimate the rate of acceptance of the HPV vaccine among adolescent girls in the Eastern Mediterranean Region.

Methods

The protocol of this study was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement. The following databases were searched from their inception date until February 2025: PubMed, Scopus, Web of Science, and Index Medicus Global. Two independent reviewers, for methodological validity, assessed papers selected for retrieval prior to inclusion in the review using the Joanna Briggs Institute (JBI) critical appraisal checklist . Any disagreements that arose between the reviewers were resolved through discussion, or with a third reviewer.

Results

The final results of this systematic review will be published in a peer-reviewed journal. We identified a total of 2972 articles. We removed 146 duplicates. A total of 2826 were screened by title and abstract. Then, 47 full-text articles were assessed for eligibility. Overall, 31 studies were included in this review. Eligible studies were performed in Saudi Arabia (n=14), Morocco (n=4), Lebanon (n=4), Palestine (n=2), Qatar (n=1), Oman (n=1), Tunisia (n=1), the UAE (n=1), Syria (n=1), Iran (n=1), and Pakistan (n=1). All of the included studies were cross-sectional. The acceptance rate of the HPV vaccine varied from 2.5% to 40.7%.

Systematic Review Registration

The protocol of this study was registered on 10 December 2024 at PROSPERO with the registration number CRD42024620242.

sciforum-132148: Next-Generation Cancer Vaccines and Immunotherapy: Neo-Antigen Strategies and AI-Driven Personalization for Precision Tumor Targeting

Yusra Zarlashat [1,*], Jawaria [2], Bushra Munir [3] and Abdul Ghaffar [1]

[1] Department of Biochemistry, Government College University Faisalabad, Faisalabad 38000, Pakistan
[2] Health Biotechnology Division, National Institute for Biotechnology and Genetic Engineering-C (NIBGE), Faisalabad 38000, Pakistan
[3] Institute of Chemistry, Faculty of Science, University of Sargodha. Sargodha 40100, Pakistan

Cancer immunotherapy has revolutionized oncology by using the immune system to combat cancer, with next-generation vaccines emerging as a transformative approach. The use of neo-antigens derived from tumor-specific mutations has significantly improved vaccine precision, enabling targeted immune activation against heterogeneous tumors. Furthermore, artificial intelligence (AI) is revolutionizing vaccine design by predicting the optimal antigen selection, optimizing immune epitopes, and personalizing therapies for each patient. We review recent advancements in cancer vaccine strategies, particularly neo-antigen-based and AI-driven personalized approaches to enhancing tumor-specific immune responses. The evolution of vaccine platforms, including dendritic cell vaccines, mRNA vaccines, and viral vector-based approaches, is highlighted with a focus on their mechanisms in generating strong antitumor immunity. These platforms not only differ in delivery efficiency and antigen expression but also offer unique immunological advantages. Combination strategies such as vaccines with immune checkpoint inhibitors, adoptive cell therapies (CAR-T, TCR-T), and tumor-infiltrating lymphocyte (TIL) therapy demonstrate synergistic effects in overcoming immune evasion and improving clinical outcomes. Despite these advancements, challenges such as tumor immunosuppression, antigen escape, and manufacturing scalability remain. Future directions highlight multi-omics integration, nanotechnology-based delivery systems, and biomarker-driven personalization to refine vaccine efficacy. The convergence of immunology, bioinformatics, and clinical oncology is essential to bring these innovations into routine clinical practice, enabling next-generation immunotherapies that maximize tumor eradication and long-term survival.

sciforum-127221: Preclinical Potential of γδ T Cells in Novel Personalized Antigen-Directed Immunotherapy for Triple-Negative Breast Cancer

Arnau Solé Casaramona [1,2,3,*], Romano Josi [1], Anete Ogrina [4], Ina Balke [4], Sanjana Marar [1,2], Anish Ghimire [1,2], Simone Danielle de Brot [5], Eva Sevick [6] and Mona O.Mohsen [1,2]

[1] Department of Biomedical Research (DBMR), University of Bern, Bern, 3010, Switzerland
[2] Department of Rheumatology and Immunology RIA, University Hospital Bern, Bern, 3010, Switzerland
[3] Graduate School for Cellular and Biomedical Sciences (GCB), University of Bern, Bern, 3010, Switzerland
[4] Plant Virology Laboratory, Latvian Biomedical Research and Study Centre, Riga, 1067, Latvia
[5] CCOMPATH, Institute of Animal Pathology, University of Bern, Bern, 3012, Switzerland
[6] Brown Foundation Institute of Molecular Medicine, The University of Texas Health Science Center at Houston, Houston, TX, 77030, United States

Introduction

Triple-negative breast cancer (TNBC) is highly aggressive, with poor prognosis and limited effective treatments. Virus-like particles (VLPs)-based personalized vaccines offer a promising way to induce lasting antitumor immunity. While γδ T cells play roles in cancer, their interaction with nanoparticles is unclear. Administration route impacts efficacy: subcutaneous (*s.c.*) delivery within lymphatic watersheds targeting draining lymph nodes (dLNs), enhance local and systemic immune responses.

Method

We developed plant-derived VLPs carrying TLR ligands and validated them by cryo-EM and biochemical assays. Using imaging flow cytometry and *in vivo* studies in the 4T1 *s.c.* TNBC model, we examined γδ T cell–VLP interaction and their role in vaccine efficacy. We compared three s.c. routes: systemic, targeting tdLNs, and targeting non-tdLNs. Survival was assessed under different dosing and ICI co-treatment. CD4+, CD8+, and γδ T cells were depleted to determine their contributions.

Results

γδ T cells were expanded in dLNs and internalized VLPs post-vaccination. γδ subsets showed distinct activation. tdLN-targeted delivery, especially with ICI, gave the best outcomes. Depletion of CD4+, CD8+, or γδ T cells impaired efficacy, showing all are essential. Despite their rarity, γδ T cells were key to early tumor control.

Conclusions

Our study highlights a crucial early role for γδ T cells in VLP-based cancer vaccination. Efficacy improved with ICI co-treatment and tdLN-targeted delivery, supporting inclusion of rare immune subsets like γδ T cells in cancer immunotherapy.

sciforum-127118: Programming immunity: a tetravalent mucosal nanovaccine for enhanced local and systemic antitumor responses

Romano Josi [1,2,3], Lan Yang [1,2], Arnau Solé Casaramona [1,2], Sanjana Marar [1,2], Anish Ghimire [1,2,*], Alessandro Pardini [1,2,3], Anne Cathrine Vogt [1,2], Genrich Tolstonog [4,5], Martin Bachmann [1,2,6], Simone De Brot [7] and Mona Mohsen [1,2,8]

1 Department of Rheumatology and Immunology, University Hospital of Bern, Bern, Switzerland
2 Department of BioMedical Research, University of Bern, Bern, Switzerland
3 Graduate School for Cellular and Biomedical Sciences (GCB), Bern, Switzerland.
4 Department of Otolaryngology - Head and Neck Surgery, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland.
5 Agora Cancer Research Centre, Lausanne, Switzerland.
6 Nuffield Department of Medicine, The Henry Welcome Building for Molecular Physiology, The Jenner Institute, University of Oxford, Oxford, UK.
7 COMPATH, Institute of Animal Pathology, University of Bern, Bern, Switzerland.
8 Tajarub Research & Development, Doha, State of Qatar

Introduction

Mucosal tumors, such as human papillomavirus (HPV)-driven head and neck carcinomas (HNC), present distinct therapeutic challenges due to their anatomical site and immunological environment. While most therapeutic cancer vaccines emphasize T cell responses, emerging evidence highlights a pivotal role for B cells in antitumor immunity. The contribution of B cells in mucosal tumors, however, remains poorly understood.

Methods

We evaluated an intranasally delivered, tetravalent virus-like particle (VLP) nanovaccine, Qβ-HPVag, which presents elongated HPV16 E6/E7 epitopes and includes a TLR-9 agonist for self-adjuvancy. Using a cold, orthotopic HPV$^+$ HNC mouse model, we assessed local and systemic immune responses following mucosal immunization.

Results

Qβ-HPVag significantly reduced tumor burden and enhanced infiltration and function of cytotoxic CD8$^+$ T cells within the tumor microenvironment. Critically, B cell depletion abrogated the vaccine's efficacy, revealing a central role for B cells in mediating antitumor responses. Vaccination led to the expansion of tumor-infiltrating memory B cells, plasmablasts, and IgA$^+$ B cells, and induced robust systemic HPV-specific IgG. Notably, vaccine efficacy was lost in C3-deficient mice, implicating complement activation as a key mediator of humoral immunity.

Conclusions

Our findings demonstrate that effective mucosal vaccination against HPV$^+$ HNC requires coordinated activation of both B and T cells. This study establishes B cells and complement pathways as critical components of next-generation therapeutic vaccine strategies for mucosal cancers.

sciforum-147314: Therapeutic Cancer Vaccines Combined with Immune Checkpoint Inhibitors in Head and Neck Squamous Cell Carcinoma: A Systematic Review of Clinical Evidence

Inesa Stonkutė [1,*], Nida Kilinskaitė [1] and Mindaugas Žukauskas [2]

[1] Faculty of Odontology, Medical Academy, Lithuanian University of Health Sciences, J. Lukšos-Daumanto 2 LT-50106, Kaunas, Lithuania
[2] Department of Maxillofacial Surgery, Medical Academy, Hospital of Lithuanian University of Health Sciences, Eiveniu 2 LT-50161, Kaunas, Lithuania.

Background

Head and neck squamous cell carcinoma (HNSCC) is a recurrent cancer of the oral cavity, pharynx, and larynx, closely linked to tobacco and alcohol use and the oral microbiome [1,2]. Standard treatment relies on surgery, radiotherapy, and chemotherapy, while immune checkpoint inhibitors (ICIs) are used in advanced disease but achieve modest response rates (~15-20%) and frequent resistance [3–5]. Cancer vaccines that expand antigen-specific T cells may augment ICI efficacy by overcoming tumor immunosuppression [6,7]. This review examines current clinical evidence on such combination strategies in HNSCC.

Methods

A systematic search of PubMed, Wiley Online Library, and ASCO publications identified clinical studies of therapeutic vaccines combined with ICIs in HNSCC, published between January 2020 and July 2025. Eligible trials reported clinical outcomes including survival, response rates, or pathologic regression.

Results

Four studies met the inclusion criteria. In the randomized FOCUS trial, Antonia et al. found that UV1 vaccination with pembrolizumab in 78 recurrent/metastatic PD-L1+ patients achieved a 6-month progression-free survival (PFS) of 30% versus 40% with pembrolizumab alone; median overall survival (OS) was 12.6 vs 13.1 months, with lower response rates in the vaccine arm [8]. Massarelli et al. showed that ISA101 plus nivolumab in 24 HPV-16+ patients yielded an ORR of 33%, median OS 15.3 months, and durable complete responses, linked to interferon-γ gene expression [9]. In a neoadjuvant phase II study, Kim et al. reported 63.6% major pathologic response and 36.3% complete response rates with pembrolizumab, GX-188E, and GX-I7 in 11 resectable HPV+ patients [10]. Leidner et al. observed 33.3% downstaging and 83.3% two-year recurrence-free survival in six HPV-negative patients treated with Tri-Ad5 plus bintrafusp alfa [11].

Conclusions

Vaccine–ICI combinations in HNSCC are safe and immunologically active but show inconsistent efficacy. The most encouraging results appear in HPV-positive and neoadjuvant settings, warranting larger biomarker-driven trials.

MDPI AG
Grosspeteranlage 5
4052 Basel
Switzerland
Tel.: +41 61 683 77 34

Vaccines Editorial Office
E-mail: vaccines@mdpi.com
www.mdpi.com/journal/vaccines


MDPI