Webinar series: HIV vaccine innovation: Industry perspectives & partnership opportunities

Organized by the CPP HIV Vaccine Industry Partnership Group and the HIV Vaccine Research Network of the IAS

Webinar 3: Enabling biotech HIV vaccine R&D

This third and last session of this webinar series focused on enabling biotech HIV vaccine research and development, presenting scientific approaches, platform technologies, manufacturing and regulatory considerations, and examples of ongoing vaccine development programs. The session included presentations on a PD-1 enhanced DNA therapeutic HIV vaccine, a polyvalent DNA prime–protein boost HIV vaccine, an mRNA platform with STI applications, as well as regulatory pathways for novel vaccine platforms.

Opening & framing remarks

Building on the previous sessions, which addressed scientific advances and industry perspectives, this session shifted focus to enabling biotech HIV vaccine R&D. The objective was to identify key enabling needs and collaboration opportunities across the HIV vaccine ecosystem, with particular attention to platform development and translational pathways.

Presentation 1: PD-1 enhanced DNA therapeutic HIV vaccine (Immuno Cure Biotech)

Summary:

The first presentation outlined the development of a therapeutic HIV DNA vaccine (ICVAX®) using a PD-1 enhanced platform, including its scientific basis and mosaic antigen design. Phase 1 clinical trial results and a bridging study were presented, alongside the design of an ongoing Phase 2 study.

Key points:

- ICVAX® is built on translating basic research into a therapeutic product, integrating antigen design, immune targeting and delivery into a DNA vaccine platform
- The platform uses a PD-1 enhanced approach to guide delivery and enhance primarily effector-memory CD8+ T-cell responses
- A mosaic antigen design strategy is used to maximize coverage across circulating HIV strains in different geographical regions
- All treatment-related adverse events were mild (grade 1) with no severe events reported
- The vaccine showed robust T-cell immunogenicity, with up to a 75% response rate at optimal dose (33.3% response rate for placebo)
- Preclinical data presented show enhanced CD8+ T-cell responses associated with sustained viral suppression and long-term survival in macaques

Take away:
The PD-1 enhanced DNA vaccine platform demonstrated safety and robust T-cell immunogenicity in Phase I, supporting further clinical development.

Presentation 2: mRNA platform and STI vaccine development (Afrigen Biologics)

Summary:
The second presentation described Afrigen's mRNA technology platform for end-to-end vaccine development, its role in building local manufacturing capacity, lessons learned in vaccine development and the development of a gonorrhea mRNA vaccine candidate.

Key points:

- Afrigen's mission is to develop and manufacture priority vaccines in Africa using mRNA technologies
- The platform supports end-to-end vaccine development from antigen design to clinical development
- Afrigen's lessons learned in end-to-end vaccine development include collaborating with partners to ensure a stable supply chain, as well as access to finance (incl. government grants). They also highlight the importance of early collaboration with National Regulatory Authorities (NRAs) to strengthen regulatory systems, alongside collaborative research with industry and academia, and specialized training programmes in mRNA technology, GMP standards and biomanufacturing skills.
- Afrigen developed the first fully African mRNA vaccine (Afrivac 2121; Covid-19)
- Technology transfer has been completed with 15 partners across multiple countries
- The pipeline includes multiple diseases, including HIV, HPV, gonorrhea, RSV, TB and others
- Gonorrhea has no licensed vaccine and is a WHO priority STI due to antimicrobial resistance
- Afrigen partnered with Evaxion (Denmark), whose AI platform helped identify and down-select Neisseria gonorrhea immunogenic/protective antigens, narrowing to EVX-B2, designed as an mRNA vaccine, with cassette optimization, formulation, and scale-up done in-house, and clinical development to take place at Afrigen
- Of 6 candidate 5' UTRs tested, UTR-010 emerged as the top performer, with resulting antibodies able to kill multiple Gonorrhea strains, including the multidrug-resistant "superbug" H041, and was selected for scale-up using the Quantum system
- Next steps include testing novel lipids to improve liquid nanoparticle (LNP) delivery/stability, plus further immunogenicity studies, including an ongoing challenge study at the University of Massachusetts (funded by the BactiVac Network)

Take away:
Afrigen's Gonorrhea vaccine program demonstrates how combining external biotech innovation (Evaxion's AI-driven antigen discovery, Yale's UTR expertise) with in-house development capabilities (formulation, scale-up, clinical development) can accelerate end-to-end vaccine development.

Presentation 3: Regulatory pathways for novel vaccine platforms (CEPI)

Summary:
The third presentation outlined regulatory considerations for new vaccine platforms, with a focus on platform-based approaches to HIV vaccine development, including definitions, evidence frameworks, and regulatory strategies.

Key points:

- Given HIV's complexity and the virus's ability to adapt, CEPI advocates a platform approach to vaccine development, building a reusable body of knowledge/infrastructure
- This approach offers four key benefits: speed (not starting from scratch), adaptability (rapid response to viral changes), consistency/comparability (back to the original platform), and global scalability
- From a regulatory standpoint, "platform" is often misunderstood as a broad category like "RNA", but in practice it must be defined much more narrowly as a developer-specific set of technologies, processes, and facilities that together produce a predictable, repeatable manufacturing process
- The goal is to identify and invest in these specific platforms now, between outbreaks, so that regulatory and manufacturing groundwork is already in place, allowing for fast, well-prepared responses (for HIV or future outbreaks) once needed
- This pre-positioning also depends on having the right partnerships established in advance, so platforms can be deployed effectively when a new outbreak or viral adaptation demands it

Take away:
Investing in developer-specific platform technologies now, ahead of need, enables faster, partnership-driven vaccine responses to future outbreaks and viral adaptation.

Panel discussion and interactive Q&A

Summary:
The panel discussion focused on practical aspects of biotech HIV vaccine development, including clinical interpretation, manufacturing challenges, regulatory engagement and development strategies.

Key discussion areas:

- Immuno Cure Biotech clarified technical aspects, including how vaccine coverage is defined through sequence homology and how clinical findings such as splenomegaly were interpreted during early trials
- Aspirations for global harmonization were seen as challenging but possible, though regional alignment was viewed as more immediate and achievable, with CEPI noting strong willingness to collaborate within regions, and regional hubs worldwide seen as a meaningful step toward equitable access
- Shared operational challenges faced by early-stage biotech companies were discussed, including manufacturing scale-up, supply chain constraints, long lead times, cost pressures, access to re-agents, and their impact on development work

- Technology transfer and collaboration were described as ongoing processes requiring coordination with multiple partners, such as MPP, and varying levels of development readiness
- Early and continuous engagement with national regulatory authorities was emphasized as important to address issues early and improve development efficiency
- De-risking strategies discussed included focusing pipelines, combining funding sources (govt, private, venture capitalists), validating platforms early, and using staged project management approaches
- Platform selection was discussed in relation to prior research data, feasibility, and external drivers such as global demand and technology transfer initiatives

Panel take away:
The discussion showed that biotech HIV vaccine development involves practical challenges across manufacturing, funding and scale-up, and that developers are addressing these through focused pipelines, staged development, partnerships, technology transfer and early regulatory engagement. Participants also pointed to regional harmonization and regional manufacturing hubs as practical, near-term opportunities to advance equitable access.

Presentation 4: Polyvalent DNA Prime–Protein Boost HIV Vaccine (PDPHV)

Summary:
This last presentation described a polyvalent DNA prime–protein boost HIV vaccine approach (PDPHV), addressing low immunogenicity and high mutation rates of HIV Env antigens. The design, immunological rationale and clinical results from human studies including HVTN124 were presented, along with analyses of antibody responses, monoclonal antibodies and the next steps toward Phase 2a trials.

Key points:
- The PDPHV approach addresses "low immunogenicity of Env antigens" and "high mutation rate of HIV-1 Env antigens" through a DNA prime–protein boost strategy and polyvalent Env antigens
- The vaccine uses sequential delivery, with DNA priming to stimulate antigen-specific B cell responses and protein boost to expand memory B-cells and antibody production
- The approach induces strong immune responses, including high response rates, high titers, broadly reactive IgG, ADCC activity, neutralizing antibodies and polyfunctional CD4+ T-cell responses
- The polyvalent design increases coverage across HIV subtypes and is associated with high-titer IgG3 responses against V1V2 and the highest protection-correlated breadth score among HVTN trials
- Protective CD$-binding site monoclonal antibodies isolated from vaccinees
- Responses are long lasting (up to 6–12 months), with a high safety profile, supporting advancement to a phase 2a study this year in both South Africa and United States

Take away:
The polyvalent DNA prime–protein boost vaccine approach induced polyfunctional and durable immune responses, including broadly reactive antibodies and CD4+ T-cell responses, supporting further clinical development in phase 2a studies.

Overall message:

Across the presentations and the panel discussion, the session illustrated how biotech innovation is tackling persistent scientific challenges in HIV, including low immunogenicity, viral diversity, and the need for adaptable platforms. Critically, none of this progress happens in isolation: each program depends on strategic partnerships, between biotechs, academic institutions, and regulators, to access antigen discovery tools, specialized expertise, funding, and manufacturing capacity. The panel discussion reinforced that translating these scientific advances into deployable vaccines requires equal attention to practical enablers: early regulatory engagement, technology transfer, diversified funding, and staged de-risking strategies. Looking ahead, platform-based approaches and regional manufacturing hubs emerged as key opportunities to accelerate development timelines and advance equitable global access to HIV vaccines.